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Preliminary Biodiversity Development Assessment Report

515 Crookwell Road, Kingsdale, NSW (Lots 103 and 104 // DP 1007433)

Prepared for: Precise Planning

16/05/2022 Version: 1.2 Final

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PREPARED FOR	Precise Planning			
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Glossary and abbreviations

Acronym	Description
BAM	Biodiversity Assessment Method
BC Act	*NSW Biodiversity Conservation Act 2016*
BC Reg	*Biodiversity Conservation Regulation 2017*
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BVM	Biodiversity Values Map
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DA	Development Application
DAWE	Department of Agriculture, Water and the Environment
DotE	Commonwealth Department of the Environment (now DAWE)
DPE	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industry
EPBC	*Commonwealth Environment Protection and Biodiversity Conservation Act 1999*
FVS	Floristic Value Score
GMLEP	*Goulburn Mulwaree Local Environmental Plan 2009*
HBT	Hollow bearing tree
IBRA	Interim Biogeographic Regionalisation of Australia
LGA	Local Government Area
MNES	Matters of National Environmental Significance

NTG-SEH	Natural Temperate Grassland of the South Eastern Highlands
NRAR	Natural Resources Access Regulator
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
SAII	Serious and Irreversible Impacts
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community
TSSC	Commonwealth Threatened Species Scientific Committee
WM Act	NSW Water Management Act 2000
VI	Vegetation Integrity
VIS	Vegetation Information System
VMP	Vegetation Management Plan

1 Introduction

1.1 Background

This Preliminary Biodiversity Development Assessment Report (BDAR) has been prepared to accompany a Planning Proposal (PP) seeking to change the land use zoning at 515 Crookwell Road, Kingsdale, NSW (Lots 130 and 104 // DP 1007433; the 'study area' **Figure 1.1**) to facilitate a future redevelopment of the site.

The *NSW Biodiversity Conservation Act 2016* (BC Act) establishes the biodiversity assessment requirements for proposed developments and land use change. Part 6 of the BC Act establishes the Biodiversity Offsets Scheme (BOS) which aims to ensure there is no net loss of biodiversity values. Where a proposed development triggers the BOS, a BDAR prepared in accordance with the Biodiversity Assessment Method (BAM; DPE 2020) must accompany the DA. Triggers for entry into the offset scheme are detailed within Part 7 of the *Biodiversity Conservation Regulation 2017* (BC Reg) and are as follows:

- **Native vegetation clearing thresholds** – the areas of native vegetation clearing proposed in relation to the minimum lot size used to determine whether entry into the BOS is triggered, **AND/OR**
- **Biodiversity Values Map** – Proposed development is said to exceed the biodiversity threshold where it involves the clearing of native vegetation on land included on the Biodiversity Values Map (BVM), **AND/OR**
- **Significant impact** – A Test of Significance (in accordance with Part 7.3 of the BC Act) is required for development proposals that are situated on the BVM and that do not exceed the BOS clearing thresholds. If the Test of Significance indicates that there is likely to be a significant impact, the BOS is triggered.

This Preliminary BDAR has been prepared as the proposed future development was considered to have the potential to trigger entry to the NSW Biodiversity Offset Scheme based on an exceedance of the native vegetation clearing threshold of 1 ha for a lot size 40 ha to less than 1000 ha. Whilst the PP itself would not permit the removal of native vegetation; it would pave the way for a subdivision Development Application (DA) that would be required to consider the impacts of the development in accordance with the NSW Biodiversity Offset Scheme.

This Preliminary BDAR has been prepared in accordance with the BAM (DPE 2020) to document the predicted impacts to biodiversity and has been prepared by Ed Cooper, an Accredited Assessor (#18047) in accordance with the BC Act and NSW BC Reg. This Preliminary BDAR describes the outcome of the development assessment case (00030817/BAAS18047/22/00030818) conducted consistent with the BAM.

1.2 Location and site identification

The BAM defines the land to which the BDAR applies as the ***subject land*** which includes areas that are proposed to be directly and indirectly impacted. For the purposes of this Preliminary BDAR, the subject land includes the approximately 54.75 ha of land within the

yellow polygon shown in **Figure 1.2**. The subject land includes 53.97 ha of Lot 103 and 0.78 ha of Lot 104 // DP 1007433. The total area size for the study area is 165.37 ha.

The subject land is situated in the Goulburn Mulwaree Local Government Area (LGA) and is zoned under the Goulburn Mulwaree Local Environmental Plan (GMLEP) 2009 as C3 – Environmental Management.

The subject land generally consists of cleared land modified for agricultural practices and subject to several management regimes. Areas of semi-native low-density grasslands, exotic grasslands and planted exotics and non-endemic native trees and shrubs are present within the subject land.

The subject land slopes gradually to the east from its centre and plateaus before reaching Crookwell Road to the east. The subject land is bound by Crookwell Road to the east and by pasturelands on all other boundaries.

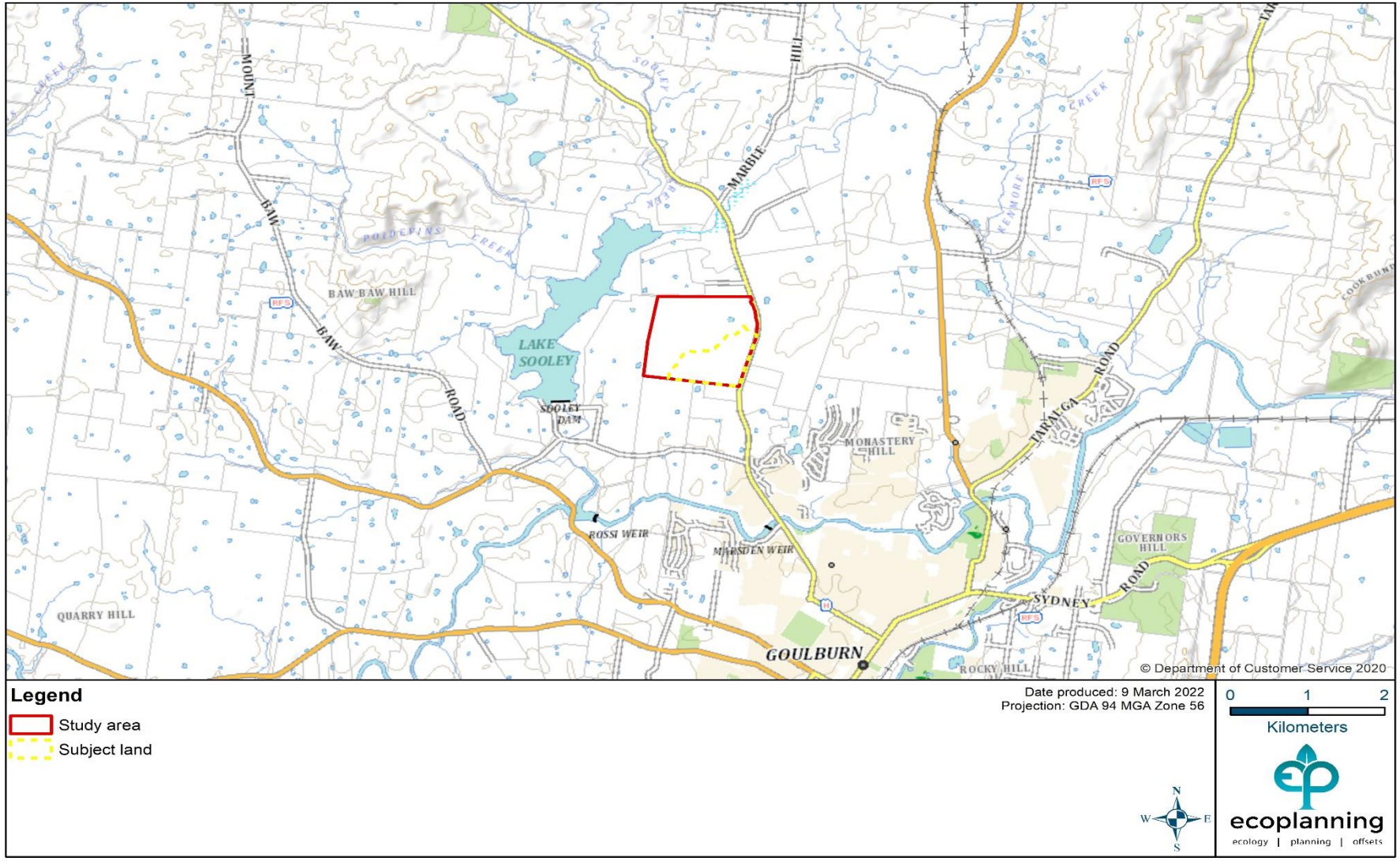

Figure 1.1: Location of study area

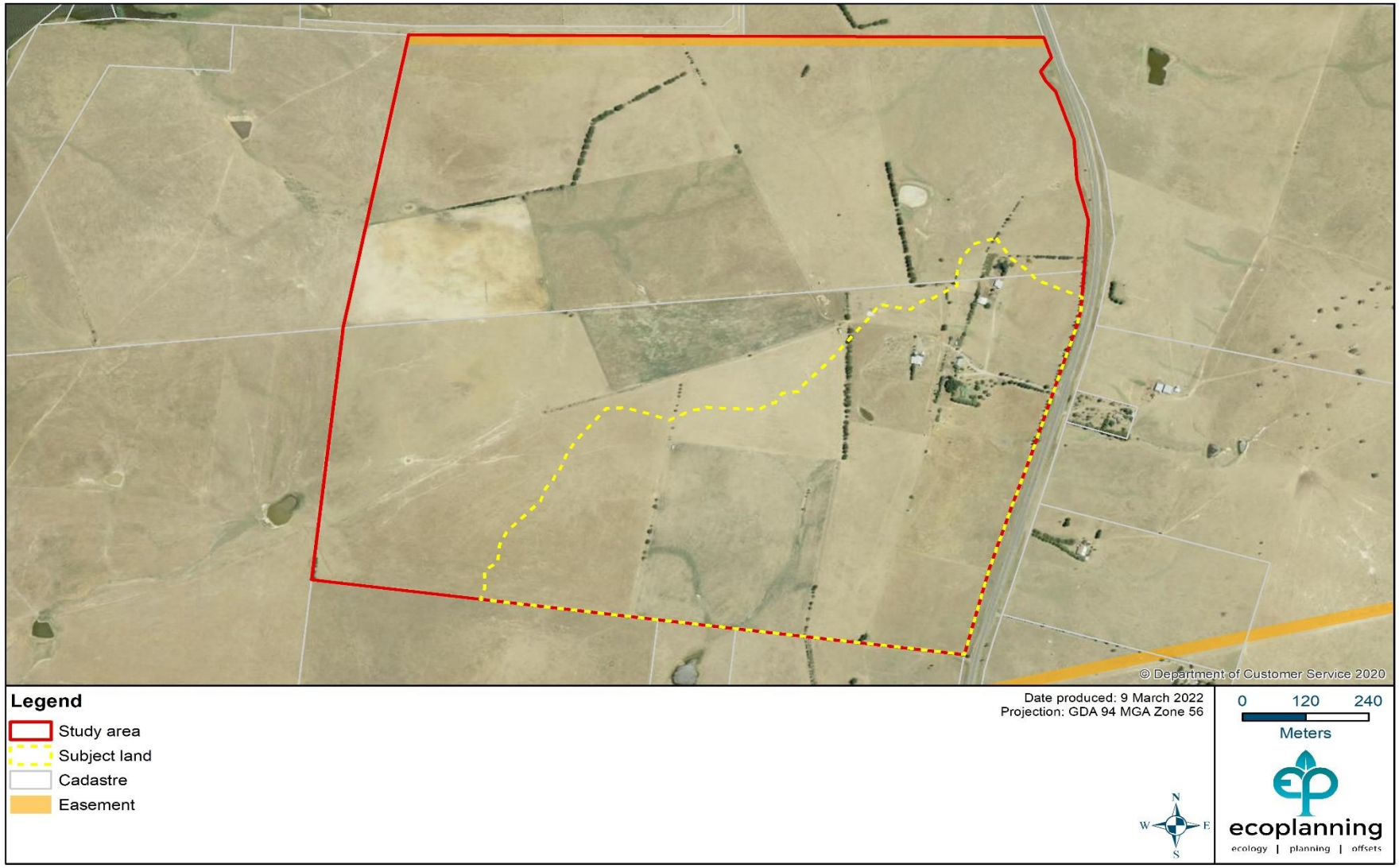

Figure 1.2: Subject land site map

2 Landscape context

2.1 Identifying landscape features

In accordance with the BAM, a number of features are assessed within and surrounding the subject land and a 1,500 m buffer around the subject land (**Figure 2.1**). These landscape features are used to identify biodiversity values that are important for the subject land and inform the habitat suitability of the subject land for threatened species. Other features, such as rivers, streams, estuaries and wetlands, habitat connectivity, karst areas or areas of outstanding biodiversity value are considered, where appropriate.

2.1.1 IBRA regions and subregions

The Interim Biogeographic Regionalisation of Australia (IBRA, DoEE 2015) represents a landscape-based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna species present. The subject land is located entirely within the '**Monaro'** IBRA subregion (version 7) and within the '**South Eastern Highlands**' IBRA region (version 7) (**Figure 2.1**). These values were entered into the BAM-C.

2.1.2 NSW landscape regions (Mitchell Landscapes)

The subject land is located entirely within the '**Rockley Plains**' (Mitchell Landscapes v3.1) and this was entered into the BAM-C. Land within the 1,500 m assessment circle is located within the 'Gundary Plains' and 'Breadalbane Swamps and Lagoons' Landscapes (**Figure 2.1**).

2.1.3 Other features

Rivers, streams and estuaries

Rivers, streams, and wetlands located within the 1,500 m buffer of the subject land, including the associated riparian buffers calculated in accordance with Appendix 3 of the BAM, are shown in **Figure 2.1**.

The subject land contains three unnamed 1st order watercourses. Two of the watercourses are located within the southern portion of the subject land, the third watercourse intersects the subject land from the north eastern boundary to the south. Development within 40 m of a watercourse will trigger a Controlled Activity Approval under the NSW *Water Management Act 2000* (WM Act). The Natural Resources Access Regulator (NRAR) guidelines (NRAR 2018) require a Vegetated Riparian Zone (VRZ) either side of mapped drainage lines. The width of a VRZ is predetermined and standardised for watercourses based on their Strahler order. Given all the watercourses present with the subject land are 1st order streams they will require a 10 m buffer either side of the channel. The 1st order streams within the subject land did not present any evidence of a discernible bed and bank and analysis of the Department of Primary Industry (DPI) Water (2012) data does not show these mapped streams flowing into any major rivers.

The subject land contains two small farm dams. The dams contained little vegetation and are used for livestock, however, could provide habitat for amphibians and waterfowl.

Local and important wetlands

Under the BAM, a **Local Wetland** is defined as an area of land that is wet by surface water or groundwater, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle (DPE 2020). An **Important Wetland** is a wetland listed under the Directory of Important Wetlands of Australia (DIWA, Environment Australia 2001) or an area included under the State Environmental Planning Policy (Coastal Management) 2018 (SEPP CM).

Two artificial dams are present within the subject land (~0.07 ha). The dams are used for livestock and no native vegetation is present around the dams. No important wetlands are present within the subject and it is not mapped under the SEPP CM. Lake Sooley is located approximately 1 km west of the subject land and Wollondilly River is located approximately 1.8 km south of the subject land.

Habitat connectivity

The subject land does not form part of any recognised biodiversity corridor, flyway, or habitat connectivity feature. The subject land and surrounding properties have been largely cleared and are managed for agricultural activities, which has significantly reduced habitat connectivity across the landscape. Additionally, Crookwell Road, which runs parallel to the eastern boundary of the study area, can potentially act as a hard barrier for some fauna species, interrupting habitat connectivity with farmlands located east of the subject land.

However, the subject land is mapped under the SEPP (Sydney Drinking Water Catchment) 2011 (SEPP SDWC), Sydney Drinking Water Catchment Map. Any land mapped within the Sydney Drinking Water Catchment Map must adhere to Part 2 – Assessment and approval of development and activities of the SEPP SDWC (2011). One of the key conditions of the SEPP SDWC (2011) states that a consent authority must not grant consent for development to land in the Sydney Drinking Water Catchment unless it is satisfied that the carrying out of the proposed development would have a neutral or beneficial effect on water quality.

Areas of geological significance and soil hazard features

No landscape features including areas of geological significance (including karst, caves, crevices, and cliffs) or soil hazard features have been identified within the subject land. Soil groups present within the subject land are presented in **Figure 2.2**.

Areas of outstanding biodiversity value

No areas of outstanding biodiversity have been identified within the subject land.

2.2 Determining site context

2.2.1 Assessing native vegetation cover

In accordance with Section 3.2 of the BAM, native vegetation cover must be estimated for a 1,500 m buffer around the subject land to determine the landscape context of the subject land. The extent of native vegetation on the subject land and immediate surrounds was mapped using ELA (2015) (**Figure 2.1**).

The total area of the 1,500 m assessment buffer around subject land is 1,239 ha, with the area of native vegetation within the assessment buffer being approximately 409 ha. This is a native vegetation cover of 33 % (i.e., in the >30-70 % class [Section 3.2.3 of the BAM]), and this value was entered into the BAM-C

2.2.2 Assessing patch size

Patch size as defined by the BAM as "*an area of native vegetation that*:

a) occurs on the development site or biodiversity stewardship site, and
b) includes native vegetation that has a gap of less than 100 m from the next area of moderate to good condition native vegetation (or ≤30 m for non-woody ecosystems).

Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site."

In assessing patch size, stands of native vegetation within 30 m (where in a moderate to good condition) but that are separated by hard barriers, including permanent artificial structures, wide roads or other barriers, have been treated as separate patches. These highly modified breaks in vegetation connectivity would significantly alter ecological function of these areas of native vegetation such that these areas warrant recognition as separate patches.

Section 4.3.2 of the BAM states patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-24 ha, 25-100 ha or >100 ha. Patch size was calculated for the vegetation within the subject land using the updated native vegetation extent data layer prepared for the 1,500 m buffer (see **Section 2.2.1**).

The patch of PCT 1289 vegetation within the subject land is isolated from other patches of native vegetation by a distance greater than 30 metres, therefore the patch size for this vegetation zone is equal to its extent within the subject land, being 4.13 ha. The patch size therefore fits into the <5 ha category and this value was entered into the BAM calculator for patch size.

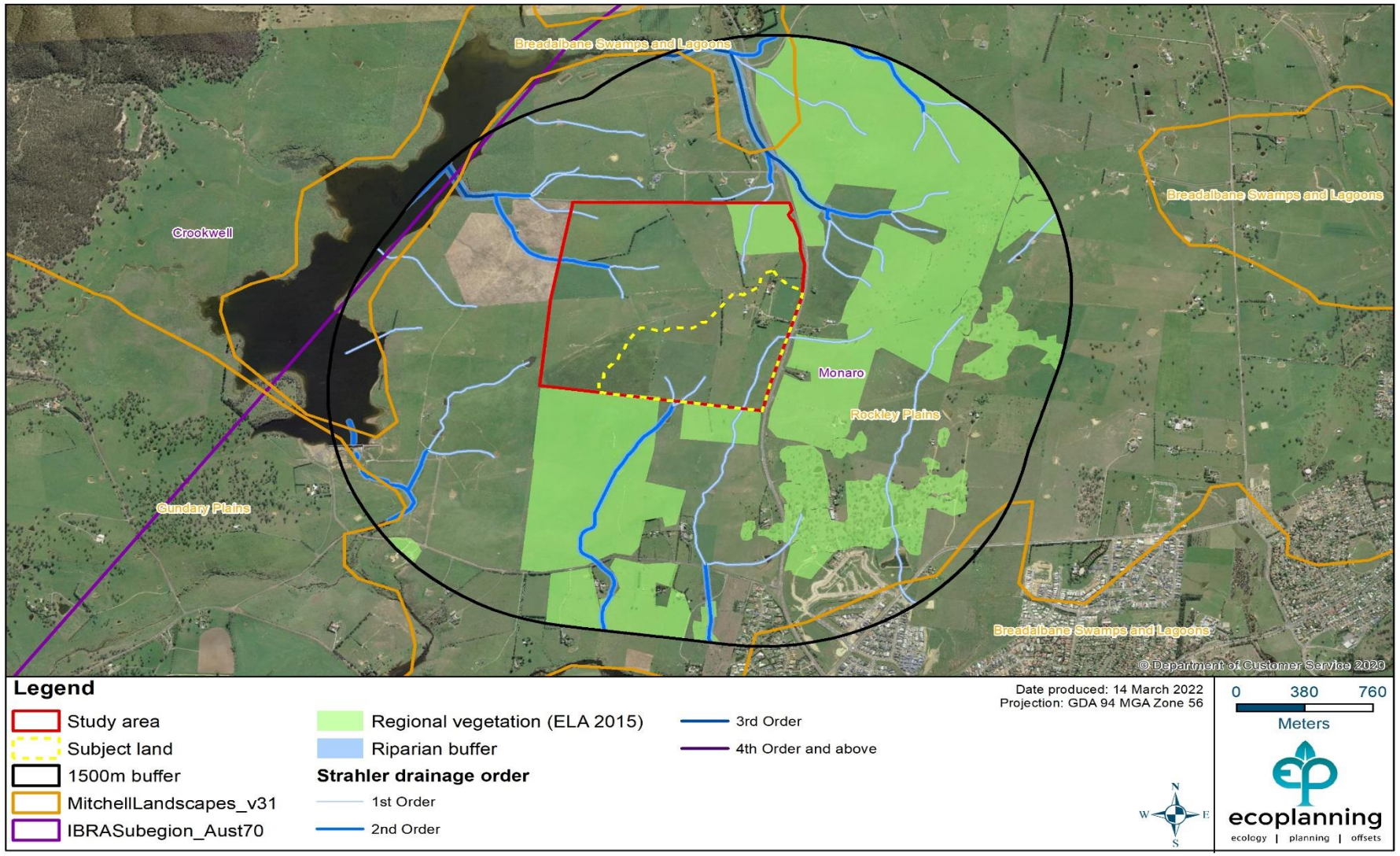

Figure 2.1: Landscape context of the subject land with respect to IBRA subregions, Mitchell Landscapes, Strahler watercourse and Native vegetation mapping

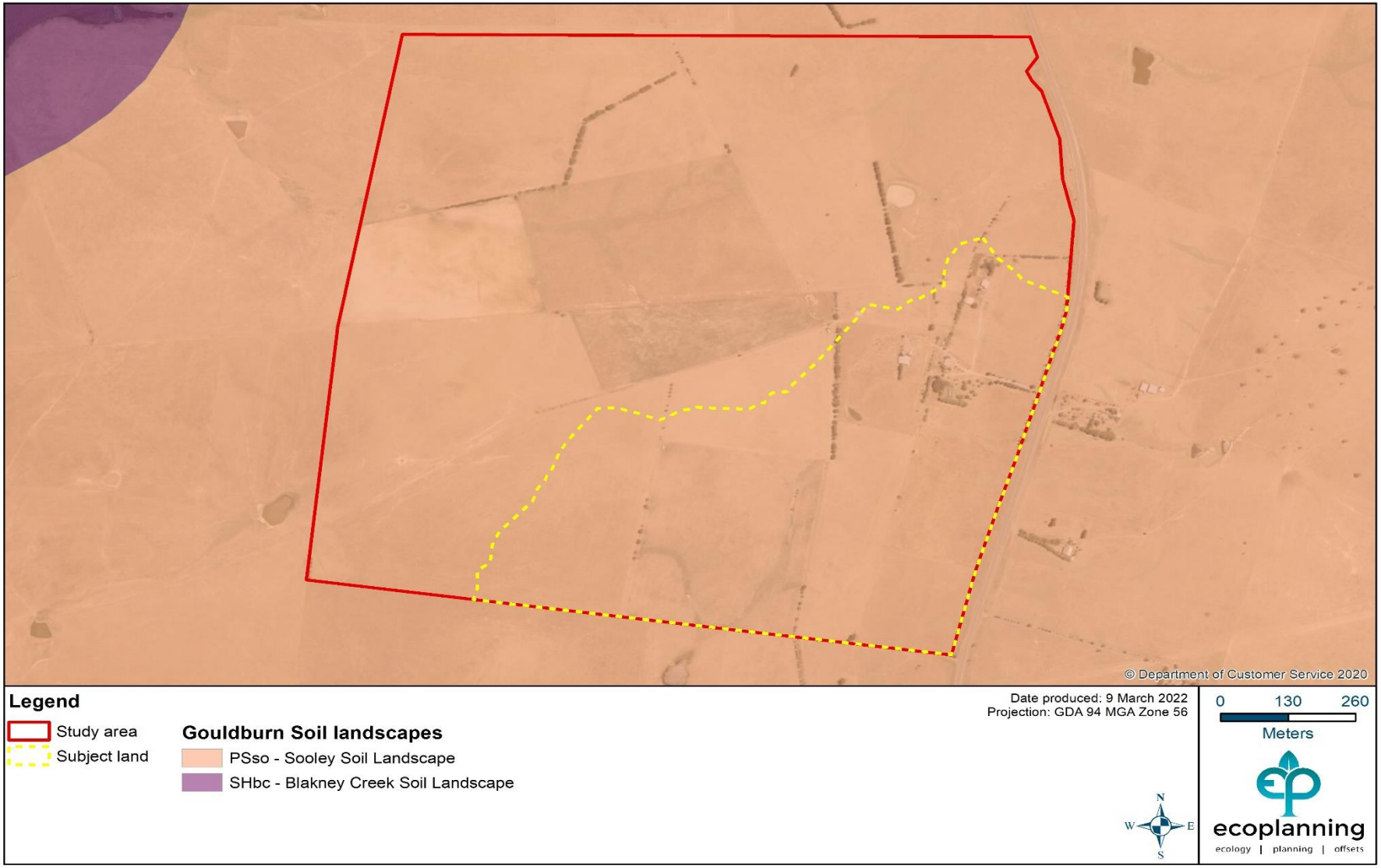

Figure 2.2: Soil landscapes found within the subject land

3 Native Vegetation

3.1 Plant community types (PCTs) and threatened ecological communities

3.1.1 Regional vegetation mapping

In accordance with Section 4.2 of the BAM, existing information relevant to the native vegetation of the subject land and the 1,500 m buffer area has been reviewed. Vegetation information associated with regional vegetation assessments (Tozer et. al 2010 and ELA 2015) have been reviewed.

Regional vegetation mapping by Tozer et. al (2010) did not identify any native vegetation within the subject land and mapped the area as 'Cleared' (**Figure 3.1**). However, vegetation mapping by ELA (2015) indicated the potential for PCT 1377 – *Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands* to be present within the north eastern section of the study area and a small patch (0.36 ha) within the southern boundary of the subject land (**Figure 3.2**). PCT 1377 is a component of Natural Temperate Grassland of the South Eastern Highlands (NTG-SEH) Threatened Ecological Community (TEC). Presence of this TEC is subject to condition thresholds been met.

3.2 Vegetation extent

In accordance with Section 4.1 of the BAM, the extent of native vegetation was identified and mapped across the subject land. A total of 4.13 ha of the 54.75 ha of the subject land was mapped as supporting native vegetation. Areas that did not support native vegetation included areas of planted mixed exotic and non-endemic native trees and shrubs and exotic grasses in which vegetation clearing had previously occurred for agricultural purposes.

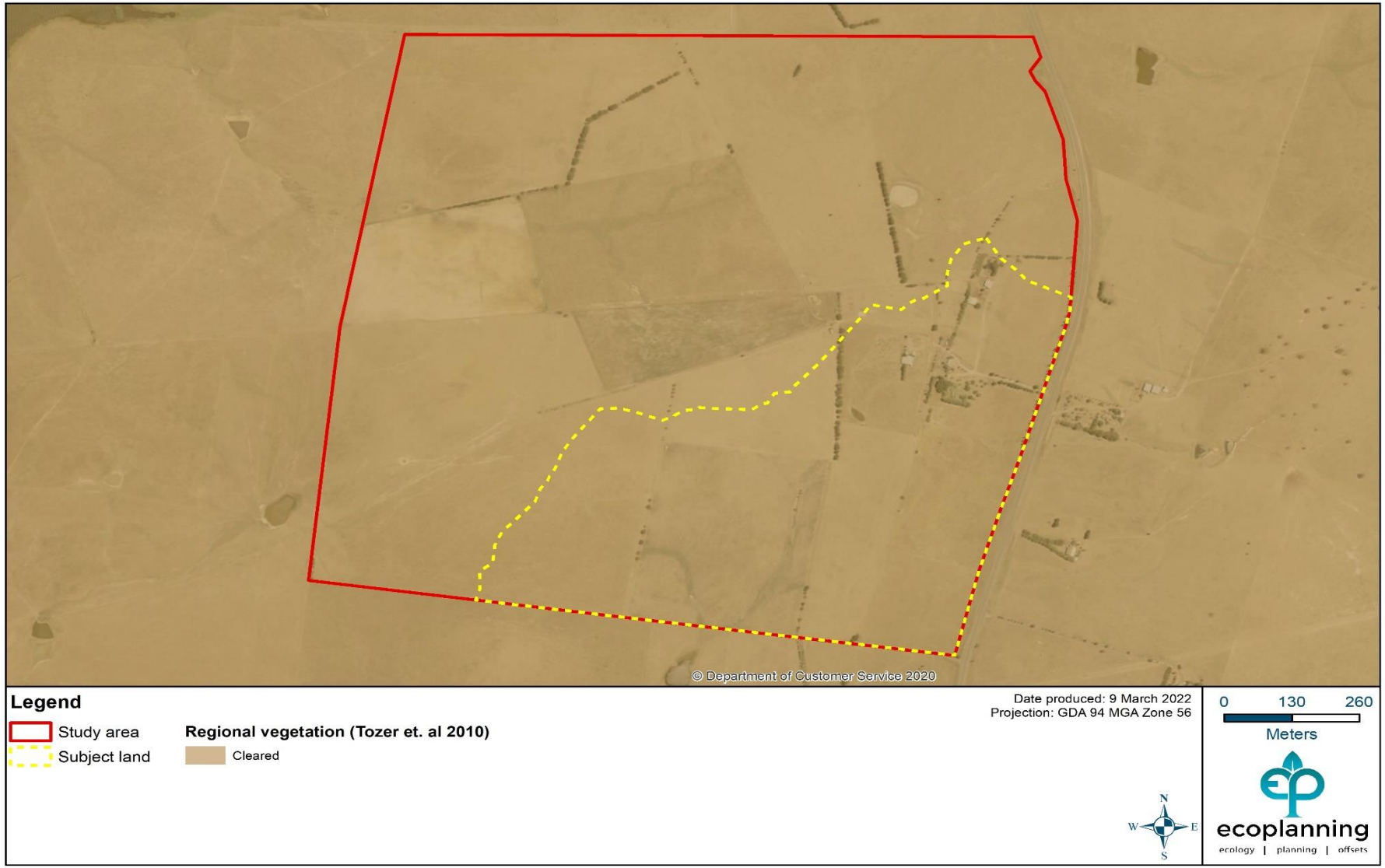

Figure 3.1: Regional vegetation mapping (Tozer et. al 2010)

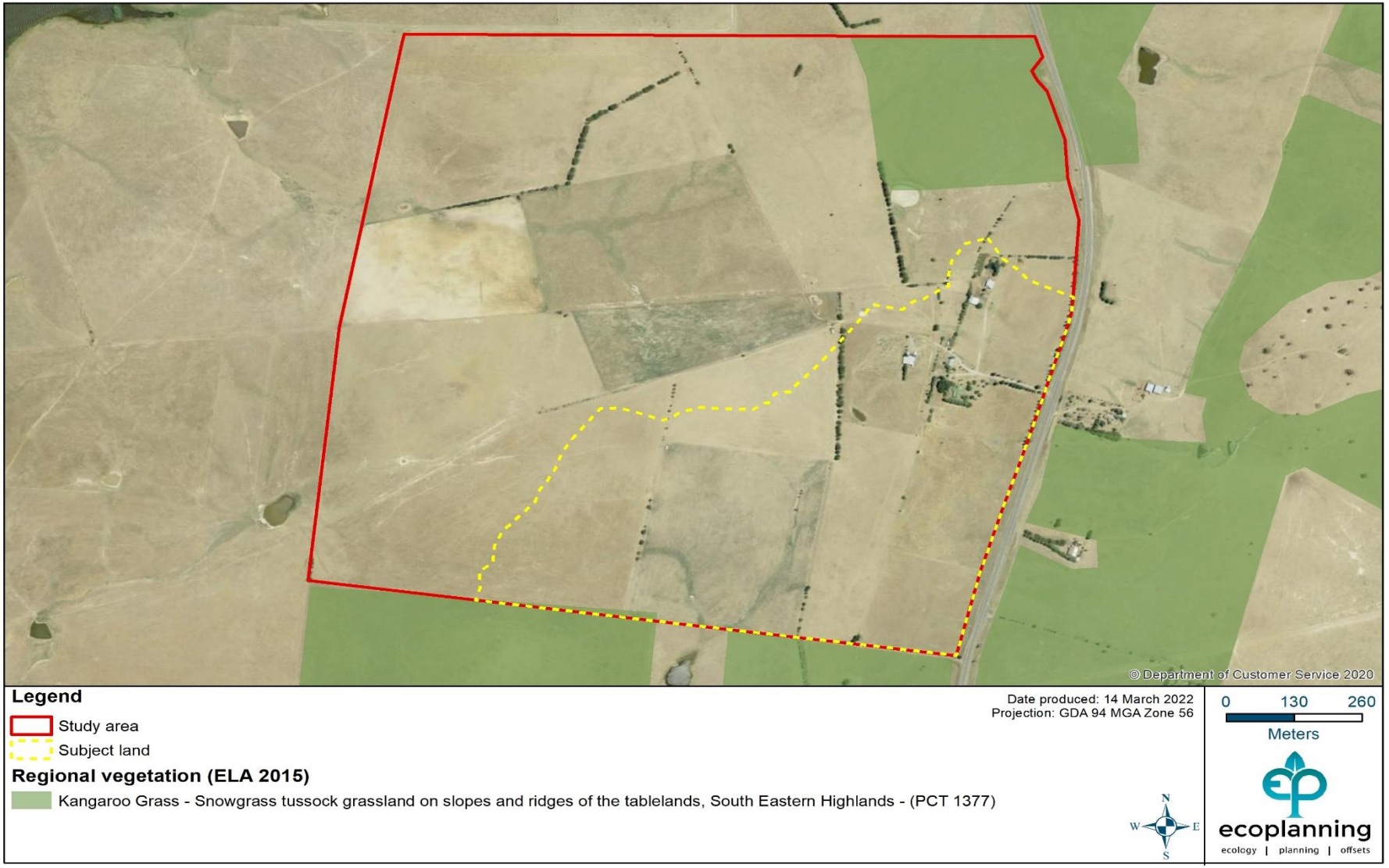

Figure 3.2: Regional vegetation mapping (ELA 2015)

3.2.1 Field assessment of vegetation communities

Assessment and mapping of PCTs was based upon mapping of vegetation communities within the local area (ELA 2015 and Tozer et. al. 2010). A plot-based survey, consistent with the BAM (DPE 2020), was undertaken by Ben Brown (Ecologist) and Edwin Vaca (Ecologist) on 27 – 28 January 2022. The subject land was traversed to sample any spatial variation within vegetation types, validate boundaries between PCTs and to record any variation in the broad condition state of vegetation to identify and map vegetation zones.

Based upon traverses of the subject land and revisions to mapped boundaries, vegetation communities present were identified within the subject land and their boundaries were mapped. The floristics of each of these vegetation communities were then sampled by plot-based floristic vegetation surveys consistent with Section 4.3.4.2 of the BAM (**Table 3.1**). The location of floristic plots is shown in **Figure 3.4**. The plot locations also represented the location of vegetation integrity (VI) plots in accordance with Section 4.3 of the BAM. The location of floristic vegetation plots was determined by randomly locating plots in representative areas of each vegetation community.

Table 3.1: Minimum number of plots required per vegetation zone (Section 4.3.4.2 of the BAM)

Vegetation zone area (ha)	Minimum number of plots required
<2	1 plot
>2-5	2 plots
>20-50	3 plots
>50-100	4 plots
>100-250	5 plots
>250-1000	7 plots; more plots may be needed if the condition of the vegetation is variable across the zone
>1000	8 plots; more plots may be needed if the condition of the vegetation is variable across the zone

The identification of PCTs for each vegetation community was undertaken in accordance with the NSW PCT classification as described in the NSW Vegetation Information (VIS) Classification Database (DPE 2022c) Determination of the most appropriate PCTs for vegetation communities within the subject land used the BioNet Vegetation Classification database to identify PCT types which matched the geographic distribution (based upon IBRA subregions), vegetation formation and floristics of vegetation within the subject land. The data for each potential PCT, including vegetation formation, descriptive attributes, and distribution information, were then reviewed to determine the most appropriate PCT for each of the vegetation communities sampled within the subject land.

Data based on observations of vegetation structure and composition made during traverses of the subject land also informed the determination of most appropriate PCTs for the vegetation communities within the subject land.

Vegetation within the subject land was also assessed against the final determinations for threatened ecological communities (TECs) listed under the BC Act and EPBC Act to determine whether the vegetation within the subject land formed part of any TEC.

3.2.2 Plant Community Types (PCTs)

Plot based floristic surveys consistent with BAM (DPE 2020) within the subject land confirmed a single native vegetation zone within the subject land: 'Semi-native Low Diversity Grassland' (4.13 ha), this community was identified where native cover was >25%, at least one of the dominant species was a native grass, and there was a very low diversity of non-grass native species. The 'Semi-native Low Diversity Grassland' community is consistent with PCT 1289 - 'Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion' in a 'degraded' condition.

Wallaby Grass – Red-grass – Tall Speargrass – Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion (PCT 1289)

Field assessment determined that native vegetation within the subject land included PCT 1289 in a degraded condition (**Figure 3.3**). Current and previous land uses have degraded the vegetation within the subject land to such an extent that PCT 1289 no longer occurs in an intact or unmodified state.

The 'Semi-native Low Diversity Grassland' of PCT 1289 was located within the south eastern section of the subject land. This patch contained the highest native projected foliage cover (33.2%) within the subject land and was dominated by *Austrostipa bigeniculata* (Yanganbil) and contained other native grasses and forbs such as *Rytidosperma spp*., *Gypsophila tubulosa* (Annual Chalkwort), *Cynodon dactylon* (Common Couch), *Cotula australis* (Common Cotula) and *Eragrostis trachycarpa.* No canopy or mid-storey species were identified within this vegetation patch.

The PCT filtering function was utilised, applying the filters of Monaro IBRA Subregion, Grassland Keith Formation and characteristic species recorded within the Subject Land. A large number of grassland PCTs were returned however PCT 1289 was selected on the basis of the 'descriptive attributes' in the BioNet Vegetation Classification (DPE 2022c) and is notably widespread in the Southern Tablelands. Due to the lack of native plant diversity within the subject land (as noted above), it would be difficult to allocate a PCT based on 'species by stratum' alone.

A summary of PCT 1289 profile from the Vegetation Information System (VIS) (DPE 2022c) is provided in **Table 3.2**. Species recorded onsite consistent with this PCT area highlighted in bold text.

Table 3.2: VIS plant community type profile (DPE 2022c) – PCT 1289

Plant community type (PCT)	Wallaby Grass – Red-grass – Tall Speargrass – Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
PCT and BioMetric veg type (BVT) ID	PCT 1289
Vegetation formation	Grasslands
Vegetation class	Temperate Montane Grassland
Upper stratum	Nil
Middle stratum	*Acacia brownii* (Heath Wattle)*; Acacia dealbata* (Silver Wattle)*; Acacia genistifolia* (Early Wattle)*; Acacia mearnsii* (Black Wattle)*; Acacia rubida* (Red-stemmed Wattle)*; Bursaria spinosa* (Native Blackthorn)*; Kunzea ericoides* (Burgan)
Ground stratum	***Austrodanthonia spp. (Rytidosperma spp.)****;* ***Austrostipa bigeniculata*** **(Yanganbil)***; Bothriochloa macra* (Red Grass)*; Calocephalus citreus* (Lemon Beauty-heads)*; Chrysocephalum apiculatum* (Common Everlasting)*; Convolvulus angustissimus; Elymus scaber* (Wheatgrass, Common Wheatgrass)*; Goodenia pinnatifida* (Scrambled Eggs)*; Lomandra spp.* (Mat-rush)*; Plantago varia; Themeda australis; Triptilodiscus pygmaeus* (Common Sunray)*; Vittadinia muelleri;* ***Wahlenbergia spp.*** **(Bluebell)***; Eryngium ovinum* (Blue Devil)*;*
Landscape position	Widespread in the Southern Tablelands (Canberra, Yass, Boorowa, Crookwell, Goulburn, Braidwood and Bungendore districts; also isolated occurrences in the Orange district; occurs mainly on well-drained footslopes and midslopes on all lithologies.
Full reference details	Rehwinkel, R. (2009). Revision of PATN analysis of grassland associations within the Natural Temperate Grassland Endangered Ecological Community in the Southern Tablelands of NSW. Report to NTG Recovery Team; Benson, J.S. (1994) The native grasslands of the Monaro region: Southern Tablelands of NSW. Cunninghamia 3(3): 609 - 650; Department of Sustainability, Environment, Water, Population and Communities (2011f). Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory in Community and Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat.;
Estimate remaining pre-European extent rounded to nearest 5%	43%
TEC Name (Listing status)	EPBC Act – listed as Critically Endangered Ecological Community – Natural Temperate Grassland of the South Eastern Highlands (Equivalent)

3.2.3 Other vegetation

'Exotic grasslands'

Vegetation within the subject land was largely dominated by exotic grasses (48.1 ha) in pastureland occupied by sheep. Numerous fenced paddocks divided the subject land with paddocks subject to different management regimes. Depending on the management regime, the cover and abundance of native vegetation varies greatly. One paddock has been cropped and is dominated by *Hordeum vulgare** (Barley) and contains less than 1% native cover. The most common exotic grass species included *Eleusine tristachya** (Crabgrass), *Bromus catharticus** (Prairie Grass), *Phalaris aquatica** (Phalaris) and *Dactylis glomerata** (Cocksfoot). Amongst the grasses were numerous herbaceous weeds such as *Hypochaeris radicata** (Catsear), *Plantago lanceolata** (Lamb's Tongues), *Cirsium vulgare** (Spear Thistle), *Paronychia brasiliana** (Brazilian Whitlow), and *Trifolium* spp.* (Clover) (**Figure 3.3**).

Although, the presence of native vegetation within this vegetation was low, or across the majority of the zone non-existent, assessment using VI plots was conducted to verify that native vegetation cover within this zone did not contain any other patches of vegetation community identified as 'Semi-Native Low Diversity Grasslands'. No further patches of PCT 1289 were identified.

'Planted exotic and non-endemic native trees and shrubs'

Vegetation within this zone included various tree species dispersed throughout the site in corridor plantings along paddock fence lines. Trees identified within the subject land are highly unlikely to be remnant and are not endemic to the area. Species identified included *Eucalyptus baueriana* (Blue Box), *Eucalyptus bridgesiana* (Apple Box) and *Pinus radiata** (Radiata Pine). Traditional farmlands often use trees such as *Pinus radiata** (Radiata Pine) as windbreaks.

This vegetation zone made up 2.44 ha of the subject land. As native vegetation within this zone only included non-endemic native trees, one VI plot was used to assess the condition and structure of this zone.

3.2.4 Threatened Ecological Communities

The Bionet Vegetation Classification database highlights that PCT 1289 forms part of Critically Endangered Ecological Community (CEEC) Natural Temperate Grassland of the South Eastern Highlands (NTG-SEH) listed under the EPBC Act.

The conservation Advise for NTG-SEH (TSSC 2016) provides four condition thresholds for when a grassland is considered a Matter of National Environmental Significance (MNES):

- Moderate to high condition A
- Moderate to high condition B
- High to very high condition
- Excellent condition

A review of the approved Conservation Advice concluded that NTG-SEH in a 'degraded' condition within the subject land didn't fulfill the Listing Advice outlined by the 'Moderate to High condition threshold category A or B' (TSCC 2016) in **Table 3.3** and **Table 3.4**. Three VI

plots were conducted within the potential NTG-SEH vegetation at favourable sampling times. The Commonwealth Conservation Advice for NTG-SEH outlines that ideal sampling times are in late spring or early summer or alternatively following rain. The surveys were conducted in late summer, however the higher-than-average rainfall during November, December and January meant that ideal survey conditions persisted into this period. Two of the three plots (BAM02 and BAM07) showed a higher percentage cover of native vascular plants (including annual and perennial species) than the percentage cover of perennial exotic species. However, none of the plots contained at least eight non-grass native species, no indicator species were present and the floristic value scores (FVS) (Rehwinkel 2015) for all plots were lower than 5.

As the grasslands do not meet these condition criteria, no further assessment was undertaken against higher condition class, 'High to Very High' or 'Excellent' condition.

NTG-SEH vegetation within the subject land was found to *not meet the condition thresholds to be considered an MNES*. As such an assessment in accordance with the Significant Impact Guidelines (DoE 2013) has not been undertaken. Nevertheless, given the close margins between the validated vegetation within the subject land and the condition criteria for NTG-SEH in a moderate to /high condition class B (**Table 3.4**), as a precaution an EPBC referral or pre-referral meeting is advised to ensure assessment of the vegetation, mapped as PCT 1289 within subject land, under the condition criteria for NTG-SEH is appropriate. The reason for this is that whilst the timing of the surveys is considered favourable due to rain, they were not conducted during late spring and early summer. If the unfavourable survey timing criteria are applied then the PCT 1289 present within the subject land would be consistent with EPBC Act listed NTG-SEH. Additional VI plots, conducted during spring to early summer of 2022 (favourable sampling times), could be beneficial in supporting the condition criteria assessment for the potential NTG-SEH within the subject land.

Table 3.3: Condition criteria for NTG-SEH Moderate to /high Condition Class A

Condition criteria to meet the Moderate to high condition class A
The patch is characterised by at least 50 % foliage cover of the ground of *Themeda triandra* (Kangaroo Grass).
This is indicative of sites with little past disturbance. Often sites with a high cover of *T. triandra* will fall into the High to Very High or Excellent condition threshold category, if further survey of non-grass or indicator species is carried out.
OR
The patch is characterised by at least 50 % foliage cover of the ground of *Poa labillardierei* (Tussock), generally in flats and drainage lines where this vegetation type naturally occurs.
Intact *Poa labillardierei* grassland is very rare and such grasslands have very important landscape and catchment values. These grasslands generally have a lower forb diversity than the other grassland associations and the forbs that are likely to be present are not the set of indicators that would be used to assess the majority of the grassland associations.
OR
The patch is characterised by at least 50 % foliage cover of the ground of *Carex bichenoviana*, or at least 50 tussocks for every 100 m2.

Condition criteria to meet the Moderate to high condition class A
Intact *Carex bichenoviana* grassland is very rare and such grasslands have very important landscape and catchment values. These grasslands generally have a lower forb diversity than the other grassland associations and the forbs that are likely to be present are not the set of indicators that would be used to assess the majority of the grassland associations.

Note: Under this category, if patches are not applicable to the particular scenarios under 'A', they can also be assessed against 'B'

Table 3.4: Condition criteria for NTG-SEH Moderate to /high Condition Class B

Condition criteria to meet the Moderate to high condition class B		
The percentage cover of native vascular plants (including annual and perennial species) in the patch is greater than the percentage cover of perennial exotic species AND		
In sampling plots of 0.04ha (e.g., 20m x 20m):		
Favourable sampling times (usually when most species are evident): At least 8 non-grass native species OR At least 2 indicator species OR A floristic value score (FVS[5]) of at least 5	OR	Other sampling times: At least 4 non-grass native species OR At least 1 indicator species[4] OR A floristic value score (FVS[5]) of at least 3

Note: Applies when cover of the grassland is not evidently dominated by the species highlighted under 'A' (TSSC 2016).

[2] To be assessed in spring to early summer, and/or other time when native plant species are most evident (e.g., significant recent rainfall that has stimulated flowering of native plants). Or if these conditions are not present, counts may be estimated from multiple surveys of the same site in different seasons or years. Also see 1.5.3, Additional Considerations, particularly Timing of Surveys.
[3] Non-grass species include forbs/herbs, lilies, orchids, rushes and shrubs. It does not include trees and, for the purposes of these thresholds, sedges.
[4] Indicator species are native plant species that are useful surrogates for conservation value of a patch and are typically disturbance sensitive species. The list is found on the ecological community profile on the Species Profiles and Threats Database (SPRAT), on the Department of the Environment's website.
[5] Floristic Value Score is a method of measuring the quality of a grassland site, based on Rehwinkel (2015).

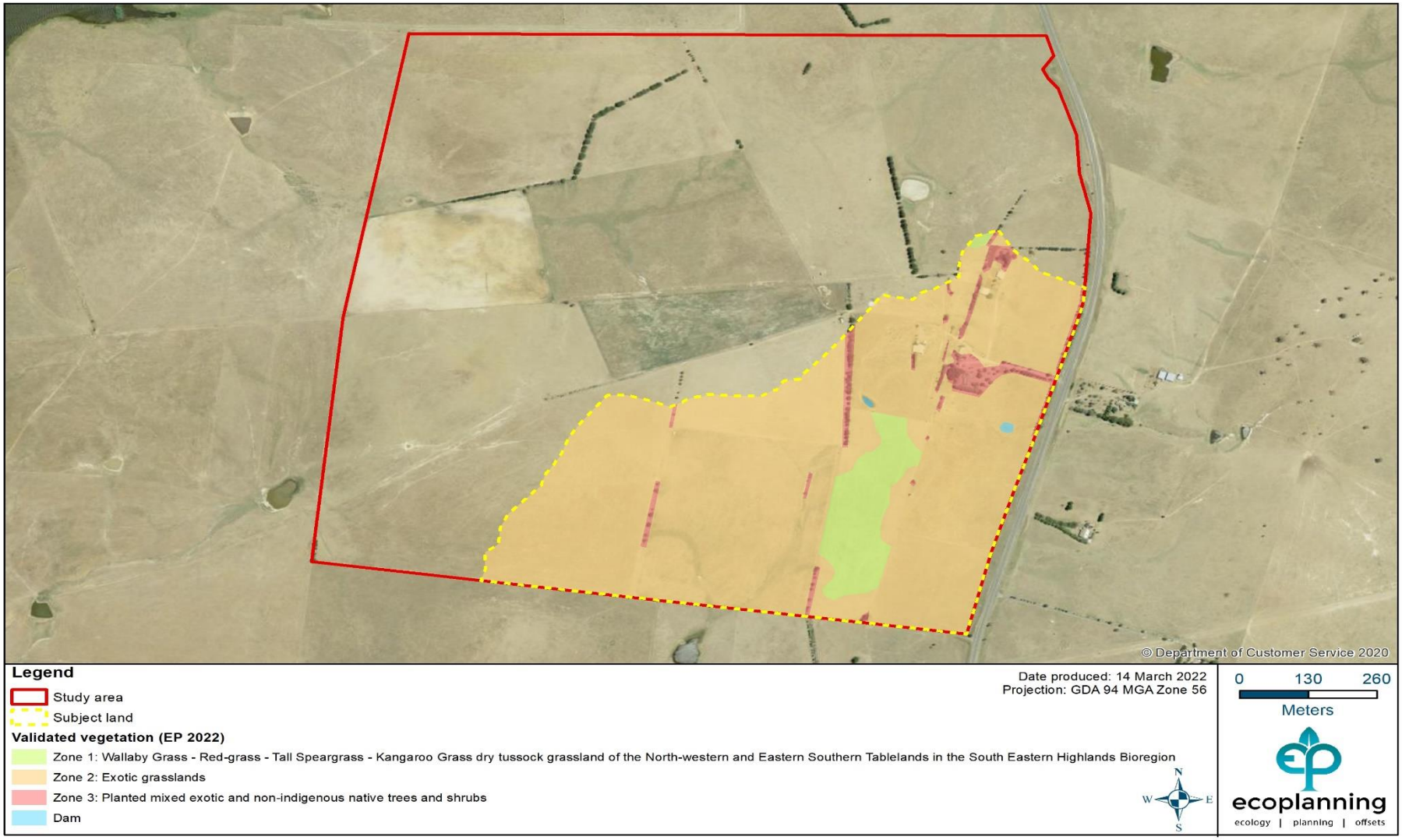

Figure 3.3: Validated vegetation zones

3.3 Vegetation zones

3.3.1 Vegetation integrity survey plots

Three VI plots were completed within the vegetation zone associated with 'Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion' (PCT 1289), to meet the requirements of the BAM (See **Appendix A** for data collected) (**Figure 3.4**).

Although the remainder of the subject land was dominated by 'exotic grasslands' and 'planted exotic and non-endemic native trees and shrubs' VI plots were completed within these vegetation zones to accurately validate the vegetation present. **Table 3.5** gives details on the vegetation zones, areas and the number of VI plots completed per community and vegetation zone

Placement of each VI plot was aimed to capture data that most represented the vegetation and attributes in each vegetation zones within the subject land.

Table 3.5: Number of VI plots required for each vegetation zone based on their respective sizes

PCT name	Vegetation zone	Area (ha)	Number of plots required (completed)*
PCT 1289 - Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion	Degraded	4.13	3 (BAM02, BAM07, BAM08)
-	Exotic grassland	48.1	6 (BAM01, BAM03, BAM04, BAM05, BAM06,)
	Planted exotic and non-endemic native trees and shrubs	2.44	2 (1 completed BAM09)

Section 4.1.2 of the BAM eliminates the requirement for assessment using VI plots for vegetation zones where native vegetation is low or non-existent. Results of VI plots for the 'Exotic grassland' and 'Planted exotic and non-endemic native trees and shrubs' vegetation zones determined native vegetation within these vegetation zones was low, or non-existent, however, to verify the current and future VI scores for these zones the VI plot data was entered into the BAM calculator.

3.3.2 Current and future vegetation integrity scores

VI scores were calculated based on the VI survey plots collected for each vegetation zone. Data collected for each plot including details on vegetation structure and composition is provided in **Appendix A**. The VI scores for each vegetation zone are provided in **Table 3.6**.

The current VI score for PCT 1289 in a 'degraded' condition class was 37.3/100. For vegetation identified within the subject land, the project would involve complete clearing of all 'Exotic grasslands' and 'Planted exotic and non-endemic native trees and shrubs' vegetation. Impacts to areas of PCT 1289 within the subject land have been predominately avoided by design, resulting in a total of 0.10 ha of PCT 1289 vegetation impacted within the subject land. Details regarding avoidance measures are detailed in **Section 5** of this BDAR. As such, the default future VI score would result in a value of 0 for PCT 1289.

Current VI scores for vegetation zones 2 and 3 are 4 and 0.3, respectively, demonstrating the highly degraded nature. Future VI scores for both these zones will also be 0.

Table 3.6: Vegetation integrity scores

Veg zone	Plant community type	Condition class	Area (ha)	Area impacted (ha)	Vegetation Integrity score	
					Before development	After development
1	Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion (PCT 1289)	Degraded	4.13	0.10	37.3	0
2		Exotic grasslands	48.1	48.1	4	0
3		Planted exotic and non-endemic native trees and shrubs	2.44	2.44	0.3	0

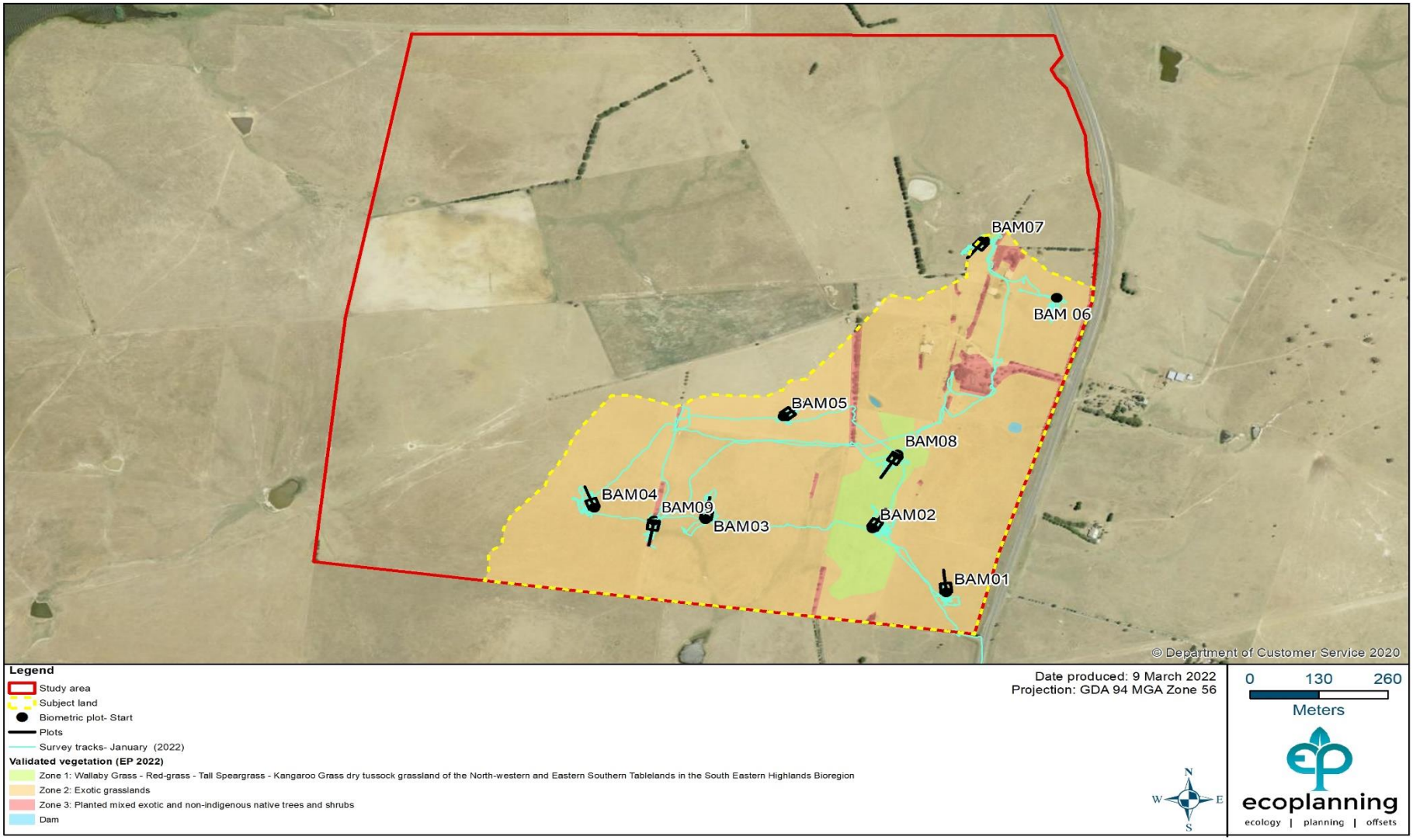

Figure 3.4: Ecoplanning (2022) survey effort, including VI plot location and survey tracks

4 Threatened species

Section 5 of the BAM details the process for determining the habitat suitability for threatened species.

Under the BAM, threatened species are separated into two classes, 'ecosystem' and 'species' credit species. Those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which a targeted survey has a low probability of detection, are identified as 'ecosystem' credit species. Targeted surveys are not required for ecosystem species and potential impacts to these species are assessed in conjunction with impacts to PCTs.

Threatened species where the likelihood of occurrence of a species or elements of suitable habitat for the species cannot be confidently predicted by vegetation surrogates and landscape features and can be reliably detected by survey are identified as 'species' credit species. A targeted survey or an expert report is required to confirm the presence or absence of these species on the subject land.

For some threatened species, they are identified as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species may have foraging habitat as an ecosystem credit, while their breeding habitat represents a species credit.

The following sections outline the process for determining the habitat suitability for threatened species within the subject lands, and the results of targeted surveys for candidate threatened species.

4.1 Threatened species for assessment

Threatened species that require assessment are initially identified based upon the following criteria:

- the distribution of the species includes the IBRA subregion in which the subject land occurs (Monaro IBRA subregion),
- the subject land is within any geographic constraints of the distribution of the species within the IBRA subregion,
- the species is associated with any of the PCTs identified within the subject land,
- the native vegetation cover within an assessment area including a 1500 m buffer around the subject land is equal to or greater than the minimum required for the species,
- the patch size that each vegetation zone is part of is equal to or greater than the minimum required for that species, and
- the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

The process for identifying threatened species which meet the above criteria is completed through the BAM Calculator. The PCT identified within the subject land, patch size and native vegetation cover, as outlined in **Sections 2** and **3**, were entered into the BAM Calculator and a preliminary list of threatened species were identified

4.1.1 Ecosystem credit species

Table 4.1 lists all ecosystem credit species generated by the BAM calculator and gives the reasoning for their omitting or retaining. Information gathered from the site assessment and species data from BioNet Atlas (DPE 2022b) was used to assist the determination for each ecosystem credit species.

Potential habitat for many of the predicted species within the subject land is considered marginal, however they could conceivably utilise the subject land on occasion or when travelling between patches of higher condition habitat. As such, all of these species have been left as a predicted species within the calculator.

Table 4.1: Assessment of habitat constraints and geographic limitations of ecosystem credit species

Scientific Name Common Name	Habitat constraints Geographic limitations	Sensitivity to Gain	Maintained as an ecosystem credit species
Artamus cyanopterus cyanopterus Dusky Woodswallow		Moderate	Yes
Chthonicola sagittata Speckled Warbler		High	Yes
Circus assimilis Spotted Harrier		Moderate	Yes
Daphoenositta chrysoptera Varied Sittella		Moderate	Yes
Dasyurus maculatus Spotted-tailed Quoll		High	Yes
Epthianura albifrons White-Fronted Chat		Moderate	Yes
Hieraaetus morphnoides Little Eagle (Foraging)		Moderate	Yes
Hirundapus caudacutus White-throated Needletail		High	Yes
Melanodryas cucullata cucullata Hooded Robin (south eastern form)		Moderate	Yes
Miniopterus orianae oceanensis Large Bent-winged Bat (foraging)		High	Yes
Petroica boodang Scarlet Robin		Moderate	Yes

Scientific Name Common Name	Habitat constraints Geographic limitations	Sensitivity to Gain	Maintained as an ecosystem credit species
Petroica phoenicea Flame Robin		Moderate	Yes
Stagonopleura guttata Dimond Firetail		Moderate	Yes

4.1.2 Identify candidate species for further assessment

In accordance with Section 5.2.1 (4) of the BAM, a predicted candidate species can be considered unlikely to occur with the subject land (or specific vegetation zones) where habitat is substantially degraded such that the species is unlikely to use the area, or where an expert report identifies that the species is unlikely to be present within the subject land (or a vegetation zone within the subject land). A predicted candidate species credit species that is not considered to have suitable habitat on the subject land (or specific vegetation zones) in accordance with Section 5.1.2 (4) of the BAM does not require further assessment on the subject land (or specific vegetation zones). The justification for determining that a predicted species credit species is unlikely to have suitable habitat on the subject land (or specific vegetation zones) is provided in **Table 4.2**.

Table 4.2: candidate species credit species, identified by the BAM calculator

Scientific Name Common Name	Habitat constraints and/or Geographic Limitations	Justification for rejection
Flora		
Commersonia prostrata Dwarf Kerrawang		Unsuitable habitat within the subject land, the species occurs on sandy, sometimes peaty soils on woodland, wetlands, open forests and open woodlands, which are not present within the subject land. Therefore, the species has been omitted.
Diuris aequalis Buttercup Doubletail	• North of Hoskintown	The species favours montane eucalypt forest and low open woodland with a grassy heathy understory, and secondary grassland. It is threatened by a decline in habitat quality due to grazing. Vegetation within the subject land is degraded due to farming practices and grazing and is dominated by exotic grasses and weeds. Given the poor quality of the vegetation found within the subject land it's unlikely that the species would be found within the subject land. As a result, the species has been omitted.
Dodonaea procumbens Creeping Hop-bush	• Cooma-Monaro Shire south of Michelago	The subject land is outside the species distribution range. The northern-most occurrence of the species is Lake Bathurst, approximately 50 km south of the study area. Therefore, the SCS has been omitted.
Eucalyptus aggregata Black Gum	• East of a line that runs north to south about 5 km west of Bungendore	The subject land is outside the determined geographic limitations of the species: 'East of a line that runs north to south about 5 km west of Bungendore'. Additionally, this species can be readily detected year-round and is a conspicuous species that would have been detected during surveys if present. Therefore, the SCS has been omitted.
Eucalyptus macarthurii Paddy's River Box, Camden Woollybutt		The spices has a moderately restricted distribution, its recorded from the Moss Vale District to Kanangra-Boyd National Park. Within the Southern Highlands isolated individuals often occur mainly in private lands, edges of roads and paddocks. Vegetation with the subject has been cleared and

Scientific Name Common Name	Habitat constraints and/or Geographic Limitations	Justification for rejection
		managed for farming purposes. Trees within the subject land have been planted along corridor plantings to divide paddocks. As a result, it's unlikely that the SCS would be present within the subject land and has been omitted.
Gentiana baeuerlenii Baeuerlen's Gentian	• Semi-permanent/ephemeral wet areas • Land containing seepage areas or seasonally wet areas with short herbfield/grassland, or • Within 50 m of swamps	No habitat constraints required for this species to utilise the subject land are present, as such this species has been omitted as a species credit species. Additionally, vegetation relevant to this species within the subject land is in such a degraded state that this species is not expected to be present within the subject land (Section 5.2.3.2 (a ii).
Lepidium hyssopifolium Aromatic Peppercress		The species appears to establish on relatively open bare ground where there is limited competition from other plants (both native and introduced species), rather than in areas with thick ground cover (Tumino, M. 2010). Persistent grazing by sheep and cattle (with no rest period) is detrimental to the survival of this species, as new recruits cannot establish. Current threats include grazing, competition and weed invasion. The subject land is actively grazed and vegetation is dominated by exotic grass and weeds with high cover across the subject land. Its therefore unlikely that the species will be found within the subject lands. The species has not been recorded within 5 km of the subject land in the past 20 years. As a result, the species has been omitted.
Leucochrysum albicans var. tricolor Hoary Sunray		The species is high dependent on the presence of bare ground for germination. Habitat within the subject land is unsuitable as areas of bare ground are limited to the access road. Furthermore, vegetation within the subject land contains a high cover of exotic species limiting the habitat necessary for the species to germinate. Its therefore unlikely that the species would be present within the subject land and has been omitted.

Scientific Name Common Name	Habitat constraints and/or Geographic Limitations	Justification for rejection
Pelargonium sp. Striatellum Omeo Storksbill		The subject land is outside the know population locations for the species; three lake-beds on the basalt plains of the Monaro and one at Lake Bathurst. Additionally, unsuitable habitat within the subject land, the species requires habitat that is usually just above the high-water level of irregularly inundated or ephemeral lakes, this microhabitat is not present within the subject land. As a result, the species has been omitted.
Prasophyllum petilum Tarengo Leek Orchid		Distribution of the species is known from five populations in NSW, near Boorowa, Queanbeyan area, Ilford, Delegate and ~10 km west of Muswellbrook. The subject land is not located near or within any of the know locations for the species. Additionally, the species is highly susceptible to grazing, as the subject land currently holds livestock and its actively grazed, it is unlikely that the species will be present within the subject lands. Therefore, the species has been omitted (Section 5.2.3.2 (a ii).
Rutidosis leptorrhynchoides Button Wrinklewort		The species is susceptible to grazing and occupies areas where there is relatively less competition from herbaceous species. Vegetation within the subject land is degraded with abundance of herbaceous weeds across the exotic grasslands, furthermore it is actively grazed. As a result, it is unlikely that the species will be present within the subject land, and therefore has been omitted (Section 5.2.3.2),
Swainsona sericea Silky Swainson-pea		The species is sensitive to grazing and susceptible to disturbance, such as road maintenance. Habitat across the entire subject land has been disturbed by farming and grazing practices, allowing exotic species to dominate, therefore it is unlikely that the species would be present within the subject land given the continued grazing and farming. As a results, the species has been omitted.

Scientific Name Common Name	Habitat constraints and/or Geographic Limitations	Justification for rejection
Thesium australe Austral Toadflax		The species is often found in association with *Themeda australis* (Kangaroo Grass) and is a root parasite that takes water and some nutrients from other plants, specially *Themeda australis* (Kangaroo Grass). Given the species strong association with *Themeda australis* (Kangaroo Grass) it's unlikely that it would be found within the subject land as *Themeda australis* (Kangaroo Grass) was not identified across the subject land. As a result, the SCS has been omitted.
Fauna		
Aprasia parapulchella Pink-tailed Legless Lizard	• Rocky areas • Or within 50 m of rocky areas	No habitat constraints required for this species to utilise the subject land are present, as such this species has been omitted as a species credit species.
Delma impar Striped Legless Lizard		The species mainly occurs within grasslands with high structural complexity. The subject land is highly disturbed and with low diversity of flora species. Consistent grazing and farming practices cause mortality through trampling and displacement and increase predation risk to the species. Therefore, the habitat within the subject land is unsuitable for the specie. The species has not been recorded within 5 km of the subject land in the past 20 years. Therefore, it is unlikely that the species would be present within the subject land and has been omitted.
Hieraaetus morphnoides Little Eagle (Breeding)	• Other • Nest trees - live (occasionally dead) large old trees within vegetation)	This species occupies eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW. Therefore, unsuitable habitat present within the subject land. Additionally, no nest or remnant nest have were identified during field survey. As a result, the species has been omitted.

Scientific Name Common Name	Habitat constraints and/or Geographic Limitations	Justification for rejection
Litoria raniformis Southern Bell Frog		No suitable habitat within the subject land. The subject land does not contain microhabitat required by the SCS: permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. As a result, this species has been omitted.
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	• Caves • Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave • Observation type code "E nest-roost • with numbers of individuals >500	No suitable breeding habitat within the subject land. The subject land does not contain caves, tunnel, mine, culvert or other structure known or suspected to be used for breeding. No breeding colony is found with a population of >500 individuals in or near the subject land. As such this species has been omitted as a SCS (Section 5.2.3.2 (a i)).
Myotis macropus Southern Myotis	• Hollow bearing trees • Within 200 m of riparian zone| Other • Bridges, caves or artificial structures within 200 m of riparian zone| Waterbodies • This includes rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site	No suitable habitat within the subject land. No hollow bearing trees were identified within the subject land. Mapped watercourses present within subject land were degraded, no evidence of bed and bank was found along the mapped streams. The dam present within the subject land is degraded and currently used primarily as a water source for the livestock on site. Its therefore unlikely that the species will utilise the subject land as roosting or foraging habitat. As a result, the species has been omitted.
Synemon plana Golden Sun Moth	• N/A| Other • Wallaby grass (Rytidosperma spp), Chilean needlegrass (Nassella nessiana) or Serrated Tussock (Nassella trichotoma)) • Not east of Lake George Escarpment or Great Dividing Range	The species is currently only known from single site in New South Wales, found in the area between Queanbeyan, Gunning, Young and Tumut. Microhabitat for the species requires bare ground between tussocks, vegetation within the subject land has a high cover of grasses dominated by exotic species. The species has not been recorded within 5 km of the subject land in the past 20 years. Therefore, it is unlikely that the species would be present within the subject land and has been omitted.

Scientific Name Common Name	Habitat constraints and/or Geographic Limitations	Justification for rejection
Tympanocryptis pinguicolla Grassland Earless Dragon		The only known populations of the species are in the ACT and adjacent NSW at Queanbeyan, and on the Monaro Basalt Plains between Cooma and south-west of Nimmitabel. The species has not been recorded within 5 km of the subject land in the past 20 years. As a result, the species has been omitted.

4.1.3 Determine presence or absence of candidate species credit species

No predicted species credit species have been identified as candidate species for further assessment and therefore no formal targeted surveys were required. Further, during fieldwork completed for this Preliminary BDAR, no threatened species were incidentally recorded.

4.2 Identifying potential prescribed biodiversity impacts on threatened species

The presence of biodiversity values prescribed by the BC Regulation have been considered in context of the subject land (**Table 4.3**). It is unlikely that potential prescribed biodiversity impacts on threatened species would occur because of the proposal.

Table 4.3: Prescribed Biodiversity Impacts

Prescribed Biodiversity Impacts	Presence within the Subject Land
(a) the impacts of development on the following habitat of threatened species or ecological communities: (i) karst, caves, crevices, cliffs and other geological features of significance, (ii) rocks, (iii) human made structures, (iv) non-native vegetation,	The subject land does not contain areas of cliffs, crevices, rocks and other geological areas of significance. Human-made structures within the subject land include the existing dwelling, a large shed used for livestock management and associated infrastructure. These features do not support threatened species or ecological communities, hence do not constitute a prescribed biodiversity impact. Non-native vegetation within the subject land includes areas mapped as 'exotic grasslands' and 'planted exotic and non-endemic native trees and shrubs'. The future proposal would impact this non-native vegetation. Non-native vegetation within the subject land does not conform to any ecological community, nor is it likely to support any threatened species with the potential to occur. Land surrounding the subject land has been subject to similar historical disturbances and therefore contains similar non-native vegetation resources to that impacted by a future development. The removal of non-native vegetation within the subject land does not constitute a prescribed biodiversity impact.
(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range,	No threatened species were found within the subject land. The subject land is bound by Crookwell Road to the east and farm lands on all other boundaries. Clearance of native vegetation within the subject land is therefore not likely to impact the movement of threatened species across the landscape.
(c) the impacts of development on movement of threatened species that maintains their lifecycle,	

Prescribed Biodiversity Impacts	Presence within the Subject Land
(d) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),	Three unnamed 1st order watercourses are mapped the southern and eastern boundary of the subject land. Evidence of bed and bank was not present during field assessment, instead they comprise wet depressions in the landscape offering little ecological value. Two small constructed farm dams will also be impacted by the proposal. Water bodies located within in the subject land do not support any threatened species. The design of the future stormwater management system will be an important part of the future Development Assessment (DA) process. It is anticipated that the stormwater system will be designed to have a neutral or beneficial effect on the quality and quantity of water leaving the subject land, however this would be assessed in more detail at a future DA stage. A further four 1st order streams and one 2nd order stream are mapped within the study area, these are located on the north and western part of the study area, outside the subject land. Development within these areas of the study area has been avoided by design, to avoid impacts to these watercourses and Lake Sooley which is 1 km west of the study area.
(e) the impacts of wind turbine strikes on protected animals,	Not applicable.
(f) the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.	The greatest risk of vehicle strike within the subject land is associated with Crookwell Road. Risk of vehicle strike on Crookwell Road is considered unlikely to be altered by a future development of the site.

5 Avoiding and minimising impacts on biodiversity

5.1 Avoiding and minimising impacts on native vegetation and habitat during project planning

In accordance with Section 7.1.1.6 of the BAM, actions taken to avoid and minimise impacts through locating the project must be documented and justified in the BDAR. Additionally, Section 7.1.1.4 of the BAM states that in selecting a project location, the following should be addressed, as they apply to the project:

- alternative modes or technologies that would avoid or minimise impacts on biodiversity values,
- alternative routes that would avoid or minimise impacts on biodiversity values,
- alternative locations that would avoid or minimise impacts on biodiversity values,
- alternative sites within a property which the proposal is located that would avoid or minimise impacts on biodiversity values.

To avoid and minimise impacts to native vegetation present within the subject land, the proposed development has been predominantly located on land dominated by exotic grasslands, planted mixed exotic and non-endemic native trees and shrubs, is used by livestock and associated infrastructure, and contains a dwelling, totalling 50.72 ha. Early lot layouts would have resulted in the complete clearing of 4.03 ha of PCT 1289, however following revisions to the lot arrangement and access roads, retention of this vegetation has been achieved. By locating the proposed development away from areas of native vegetation, consistent with PCT 1289, a total of 4.03 ha of PCT 1289 in a degraded condition is to be retained within the subject land through the use of larger lots and nominated building envelopes. The 0.10 ha of native vegetation to be impacted by a future development is subject to high abundance of weed disturbance, has been historically cleared and is currently grazed. This 0.10 ha of native vegetation loss is attributed to APZ impacts on the northern boundary of the subject land and a 2 m buffer to compensate for fence impacts within the centre of the subject land. Approximately 22.78 ha of 'Semi-native low diversity grassland' native vegetation (Ecoplanning 2021) would be retained within the study area, including a patch of higher condition native grassland to the north of the subject land.

Development has also avoided areas on the western, north eastern and north western side of the study area as these areas generally drain towards Lake Sooley, approximately 1 km west of the study area.

It's anticipated that additional avoidance measures can be investigated and implemented at the DA stage. Measures that could be considered are a S88b covenant to retain the 4.03 ha of PCT 1289 within the subject land and a Vegetation Management Plan (VMP), for this patch of native vegetation. These measures could ensure future development does not adversely impact native vegetation within the subject land whilst improving the degraded condition of PCT 1289 found within the subject land.

5.2 Avoiding and minimising prescribed biodiversity impacts during project planning

Prescribed biodiversity impacts are defined under clause 6.1 of the BC Reg and include impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. Prescribed biodiversity impacts are outlined within **Section 4.2** including their relevance to the proposal. It is not anticipated that the proposal would result in any prescribed biodiversity impacts, provided the stormwater management system is suitably designed at the future DA stage. All prescribed impacts are therefore anticipated to be avoided by the future proposal.

5.3 State Environmental Planning Policy (SEPP) (Biodiversity Conservation) 2021

5.3.1 Chapter 8 - SEPP (Sydney drinking water catchment) 2011

SEPP (Sydney drinking water catchment) (SDWC) (2011) applies to land mapped within the Sydney Drinking Water Catchment Map. This includes land mapped within several sub-catchments detailed in Part 1.7 of the SEPP.

The subject land is within the mapped boundary of the Greater Sydney Drinking Water Catchment map and within the Upper Wollondilly River sub-catchment. Assessments against relevant provisions of the SEPP (Sydney Drinking Water Catchment) are provided below.

Part 2, subclause 9 - Recommended practices and performance standards of the Sydney Catchment Authority

In accordance with SEPP (SDWC) (2011) any development or activity proposed to be carried out on land to which this Policy applies should:

- Incorporate the Authority's current recommended practices and standards
- If any development or activity does not incorporate the Authority's current recommended practices and standards, the development or activity should demonstrate to the satisfaction of the consent authority or determining authority how the practices and performance standards proposed to be adopted will achieve outcomes not less than those achieved by the Authority's current recommended practices and standard

It is anticipated that direct and indirect impacts such as surface and ground water flows will be mitigated through the implementation of a CEMP and sediment controls, which will include the current recommended practices and standards. It is also anticipated that the stormwater infrastructure design will ensure a neutral or beneficial effect on the quality and quantity of water leaving the site. These designs will be further developed at the future DA stage.

Part 2, subclause 10 - Development consent cannot be granted unless neutral or beneficial effect on water quality

In accordance with SEPP (SDWC) (2011) development consent must not be granted to development on land identified within the Sydney Drinking Water Catchment Map unless consent authority is stratified that:

- That the carrying out of the proposed development would have a neutral or beneficial effect on water quality
- For the purposes of determining whether the carrying out of the proposed development on land in the Sydney drinking water catchment would have a neutral or beneficial effect on water quality, the consent authority must, if the proposed development is one to which the NorBE Tool applies, undertake an assessment using that Tool

There are three first order streams within the subject land which will be impacted by development. During field assessment of the subject land no evidence of bed and bank were present for any of the mapped streams. Therefore, it is unlikely that the proposed development will have a negative impact on the ecological or hydraulic function of these streams. Impacts to all other streams outside the subject land have been avoided. Indirect impacts such as surface and ground water flows will be mitigated through the implementation of a CEMP and sediment controls.

6 Assessing and offsetting impacts

6.1 Assessing direct impacts to native vegetation and habitat

The proposed development could include direct impacts to 0.10 ha of PCT 1289 'Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion' in a 'degraded' condition. As mentioned in **Section 5.1**, options to avoid and minimise impacts to the PCT 1289 within the subject land have been considered during design of the development at the planning proposal stage.

A further 48.1 ha of exotic grassland and 2.44 ha of planted exotic and non-endemic native trees and shrubs could be impacted by the proposal. Two farm dams may also be impacted by the current proposal, which comprise 0.08 ha. The direct clearing and subsequent development of the subject land would represent a permanent impact, or loss, of this native vegetation and habitat. As outlined in **Section 3.3.2** of this Preliminary BDAR, and in accordance with Section 8.1.1.5 of the BAM, the future VI score for all vegetation within the subject land has been assigned 0.

6.2 Assessing indirect impacts on native vegetation

It is difficult to quantify indirect impacts associated with the project at this early stage, but these may include impacts such as runoff, noise and/or erosion associated with the project. The project is considered unlikely to reduce viability of any adjacent native vegetation or habitat due to edge effects, noise, dust or light spill as surrounding vegetation is mapped as cleared land and is used for farming. Further, within adjacent areas of potential native vegetation and habitat, the project is considered unlikely to cause any increase in tramping of flora, rubbish dumping, or introduce any pests, weeds or pathogens.

Indirect impacts will be managed through the development of a Construction Environmental Management Plan (CEMP), whereby sediment and erosion controls will be put in place. An assessment of indirect impacts is provided in **Table 6-1**. Furthermore, development of a VMP, for the 4.01 ha of PCT 1289 which is to be retained within the subject land would be put in place to maintain and improve the condition of PCT 1289.

Table 6-1: Assessment of indirect impacts

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Inadvertent impacts on adjacent habitat or vegetation	The subject land is bound by Crookwell Road to the east and managed farmlands on all other boundaries. Potential to grasslands outside the subject land will be avoided through control measures outlined in the CEMP and mitigation methods stated in **Section 6.4**. Clearing activities in proximity to other mapped native vegetation presents a risk of inadvertent impacts including accidental vegetation damaged during works etc. The consequence of inadvertent impacts to nearby vegetation is considered moderate without any control measures in place. However, with the implementation of relevant mitigation measures and the CEMP, the probability of indirect impacts occurring is considered low.	Mapped native vegetation outside the subject land	Ongoing during clearing phase	Ongoing during clearing phase	Ongoing during clearing phase
Reduced viability of adjacent habitat due to edge effects	The subject land bound by Crookwell Road to the east and managed farmlands on all other boundaries. Regional vegetation mapping by ELA (2015) maps some areas outside the southern boundary of the study area and a patch within the north eastern corner of the study area as PCT 1377. The risk of additional edge effects to these areas is considered low with a low consequence, give that land immediately surrounding the subject land is managed farmland with livestock.	Mapped native vegetation outside the subject land	Ongoing during clearing phase	Ongoing during clearing phase	Potentially long term
Reduced viability of adjacent habitat due to noise, dust or light spill	Indirect impacts from noise, dust and light spill on nearby habitat is considered low. Any impacts will be temporary and intermittent. It is anticipated that clearing will be restricted to daytime, therefore artificial light spill is unlikely to occur. The proposal is not anticipated to significantly increase ambient noise. Clearing of the grassland vegetation could lead to dust spill, however this can be controlled as part of the CEMP.	Subject land	Ongoing during clearing activities	Ongoing during clearing activities	Short term
Transport of weeds and pathogens from the site to adjacent vegetation	There is low potential to transport weeds and pathogens to nearby vegetation, following the implementation of the CEMP. The current condition of nearby vegetation is likely to be low and if similar to the subject land contains a high portion of exotic grasses and weeds. Weed management measures will be implemented during construction and operational phases to reduce the risk of pathogens and weeds invading.	Subject land	Ongoing during clearing activities	Ongoing during clearing activities	Potentially long term
Increased risk of starvation, exposure and loss of shade or shelter	The proposal is not expected to result in any indirect impacts resulting in an increased risk of starvation, exposure and loss of shade or shelter.	NA	NA	NA	NA
Loss of breeding habitats	The proposal is not expected to result in any indirect loss of breeding habitats located adjacent or nearby to the site.	NA	NA	NA	NA

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Trampling of threatened flora species	The proposal is not expected to result in any indirect impacts resulting from trampling of threatened flora species given no individuals are present within the subject land, and none were observed in adjacent areas.	NA	NA	NA	NA
Inhibition of nitrogen fixation and increased soil salinity	The proposal is not expected to result in any inhibition of nitrogen fixation.	NA	NA	NA	NA
Fertiliser drift	The proposal is not expected to result in any fertiliser drift.	NA	NA	NA	NA
Rubbish dumping	The proposal could result in a minor increase in rubbish dumping during the clearing phase. This would likely be minor in nature and managed by providing waste disposal facilities.	Subject land	Ongoing during clearing activities	Ongoing during clearing activities	Ongoing during clearing phase
Wood collection	Wood collection as a result of the proposal is considered to be low and of minor impact. Trees planted along corridor plantings within the subject land are to be removed from the subject land as part of the vegetation clearing phase of the proposal.	Corridor plantings with subject land	Ongoing during clearing activities	Ongoing during clearing activities	Ongoing during clearing activities
Bush rock removal and disturbance	The proposal is not expected to result in any bush rock removal or disturbance.	NA	NA	NA	NA
Increase in predatory species populations	The proposal is not expected to result in an increase of predatory species populations.	NA	NA	NA	NA
Increase in pest animal populations	The proposal could result in a minor increase in pest and vermin animal species as people use the subject land during the clearing phase of the proposal. This would likely be minor in nature.	Ongoing during clearing activities	Ongoing during clearing activities	Ongoing during clearing activities	Potentially long term
Increased risk of fire	The proposal is not expected to result in any increased risk of fire.	NA	NA	NA	NA
Disturbance to specialist breeding and foraging habitat, e.g., beach nesting for shorebirds.	The proposal is not expected to result in any disturbance to specialist breeding and foraging habitat.	NA	NA	NA	NA

6.3 Assessing prescribed biodiversity impacts

As described in **Table 4.3**, no prescribed biodiversity impacts are anticipated from the proposed development. Impacts to habitat associated with native vegetation has been calculated and included in **Section 7**.

6.4 Mitigating and managing impacts on biodiversity values

Efforts to avoid and minimise impacts to biodiversity values were undertaken during the siting of the subject land location within the study area. The subject land has been positioned to avoid impacts to biodiversity values that are located in the surrounding area and the proposed development layout has been designed to predominately avoid impacts to native vegetation within the subject land. For instance, the subject land avoids impacts to areas along the western, northern and north western parts of the study area as these areas slope and drain west towards Lake Sooley (515 Crookwell Road, catchment analysis 2020). Additionally, the proposed development layout has avoided development of access roads and building envelopes in areas of PCT 1289 vegetation within the subject land (**Figure 6.1**).

The complete avoidance of impacts to native vegetation would prohibit the development of the site, therefore the subject land has been located to avoid and minimise impacts to the fullest extent practical. As impacts on biodiversity values could not be avoided entirely and biodiversity values within the subject land are considered to be moderate to low given the abundant cover of exotic species and active grazing. Additionally, multiple measures will be implemented to mitigate and manage direct and indirect impacts where possible, including preparation of a Construction Environmental Management Plan (CEMP), a S88b covenant to retain native vegetation within the subject land, a Vegetation Management Plan (VMP) to manage and improve the condition of native vegetation to be retained within the subject land, and appropriate pre-clearance protocols. Details are provided below.

6.4.1 Pre-clearance protocols

Appropriate pre-clearance protocols are to be put in place at the time of vegetation clearing to mitigate and avoid potential harm or injury to any fauna present and edge effects of the vegetation clearing required. These protocols should be adaptive depending on site specific conditions. As habitat trees (where nests or other habitat features are identified) have not been identified within the subject land (at the time of survey), a pre-clearance survey should aim to identify any active nests, within the ‘planted exotic and non-endemic native trees and shrubs, a week prior to clearing. If any active nests, for threatened species, are found within the subject land, clearing of these areas should be avoided until the breeding period for the species is completed. All tree species cleared should be removed from the study area and disposed of at an appropriate facility.

The subject land contains two farm dams that may contain habitat for non-threatened aquatics species. Appropriate dam decommissioning protocols are to be put in place at the time of clearance to mitigate and avoid potential harm or injury to these individuals. A suitability qualified ecologist is to be engaged and dam dewatering protocols should be conducted in two stages.

- **Stage 1**: Reduce the dam capacity by two thirds.
- **Stage 2**: Reduce capacity by the final third while a suitably qualified ecologist is present to capture/release/humanely dispose of fish (including eels), reptile and crustaceans.

At the completion of Stage 2 the ecologist will provide clearance for activities to proceed after each dam dewatering.

Additionally, prior to clearing of vegetation:

- The boundary of the subject land should be fenced to avoid impacts to other areas within the study area.
- Signs should be clearly located along the fence to ensure no access to areas outside the subject land by works personnel or machinery.
- Fencing and signage should remain in place until all works are completed within the subject land.
- WIRES and the nearest veterinary clinic should be notified of the works and the potential for injured wildlife.

6.4.2 Construction Environmental Management Plan

To avoid potential indirect offsite impacts during construction, an appropriate erosion and sedimentation control plan should be in place following best practice protocols such as Landcom (2004). It is recommended that this is included in a site-specific CEMP prior to any construction works commencing.

The CEMP will be required to span the pre, during, and post construction periods, include the above pre-clearance, and incorporate any of the relevant Authority's current recommended practices and standards as detailed by the SEPP (SDWC) (2011).

6.4.3 Vegetation Management Plan

Approximately 22.78 ha of native vegetation within the study area will be retained, and of this approximately 4.03 ha could be restored within the subject land by implementing a VMP. Furthermore, it's possible that a S88b covenant agreement with Council could ensure that PCT 1289 to be retained within the subject land is protected from any future development or impacts.

6.5 Adaptive management of uncertain impacts

Section 8.5 of the BAM outlines uncertain impacts that would require adaptive management. Impacts associated with the proposal are largely certain and associated with the direct impacts resulting from the vegetation clearing as documented in **Section 6.1**. Uncertain impacts associated with the proposal would be limited to potential runoff, however, the risk of these impacts is relatively low and can be mitigated. During the clearing phase of this project, the works should be undertaken in accordance with best practice sediment and erosion controls and in accordance with any conditions issued by Council.

Excluding the need for a CEMP, no additional adaptive management measures are proposed.

6.6 Thresholds for the assessment and offsetting of impacts of development

6.6.1 Serious and Irreversible Impacts (SAII)

Section 6.7 of the BC Reg defines Serious and Irreversible Impacts (SAII) as impacts likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because:

a) it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or
b) it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or
c) it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or
d) the impacted species or ecological community is unlikely to respond to measures to improve its habitat

The Guidance to assist a decision-maker to determine a SAII (DPE 2019) was used to determine whether or not an impact on biodiversity values is likely to be a SAII. The guide lists in Appendix A criteria for identifying potential species and ecological communities that meet the SAII principles. The TEC, Natural Temperate Grassland of the South Eastern Highlands (NTG-SEH), present within the subject land is not listed under the BC Act and therefore is not identified as a potential SAII candidate (DPE 2022b). Therefore, assessment to determine impacts on the NTG-SEH community as a SAII are not required. Nevertheless, assessment of direct and indirect impacts and mitigation methods for clearing of this vegetation are detailed in **Section 6** of this report.

6.6.2 Impacts which require an offset

Section 9.2.1. of the BAM indicates that the following vegetation zones require offsets:

a) vegetation zones that have a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community.
b) a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat or is a vulnerable ecological community.
c) a vegetation zone that has a vegetation integrity score ≥20.

Vegetation zone 1 associated with PCT 1289 – Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion' in a 'degraded' condition, will require offsetting as it is associated with category A listed above (VI Score is 37.3).

6.6.3 Impacts that do not require offset

Areas within the subject land identified as 'exotic grasslands' (48.1 ha) and 'planted exotic and non-endemic native trees and shrubs' (2.44 ha), do not require offsetting as they have a VI score below the offsetting threshold for non-CEEC/EEC vegetation that provides habitat for

ecosystem credit species. VI scores for these vegetation zones were below 17, at 4 and 0.3 respectively, and therefore do not require offsetting.

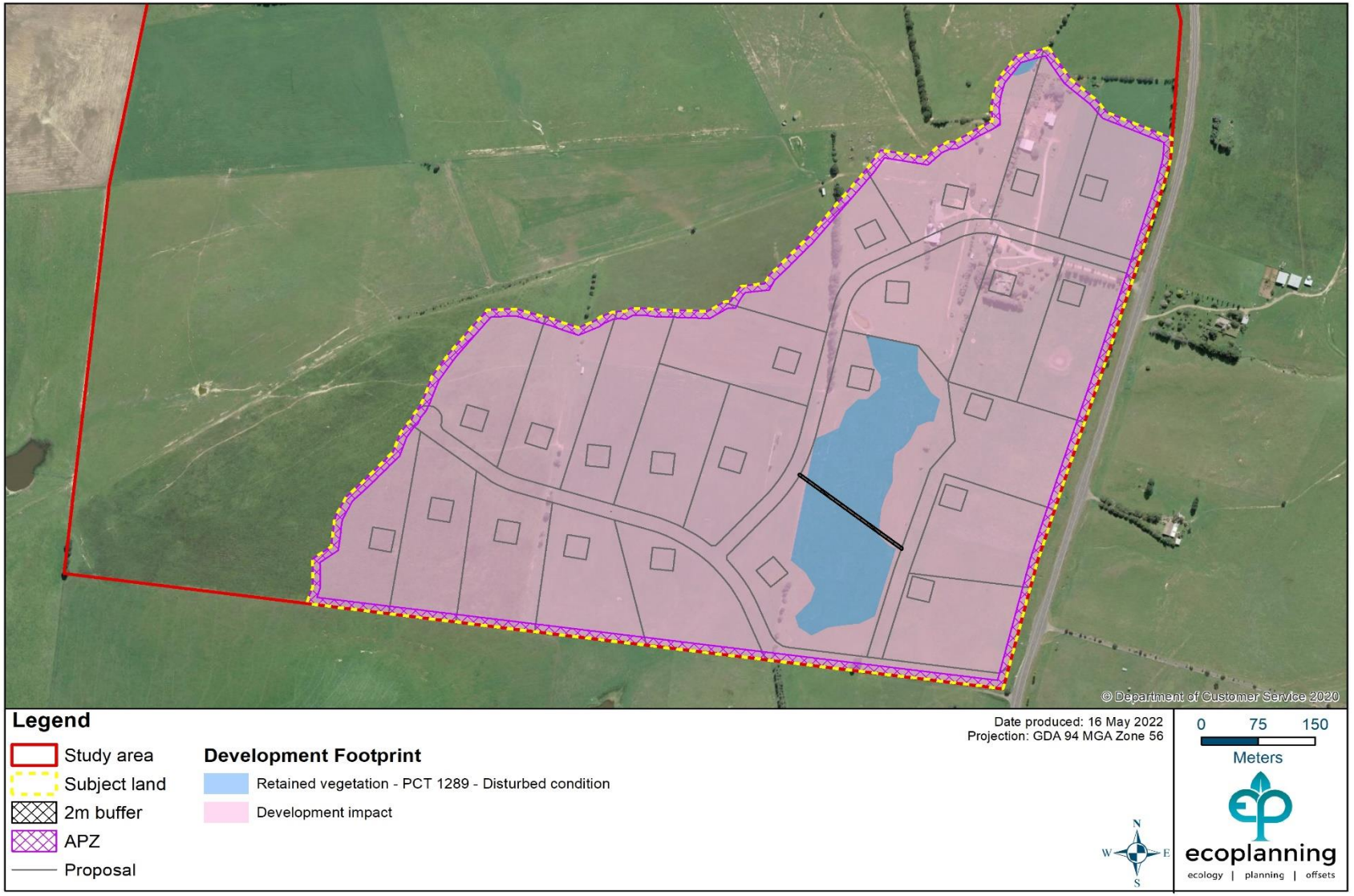

Figure 6.1: Development footprint and proposed areas of PCT 1289 to be retained within subject land

7 Estimated credit calculations

A biodiversity offset requirement for residual impacts of a proposed development, must be calculated in accordance with Section 10 of the BAM. The following section outlines the estimated credit requirements for the development in order to achieve the 'no net loss standard' as established by the BAM. These calculations assume complete loss but as mentioned above, there will be opportunities to further consider the avoidance and minimisation of impacts to native vegetation during the design development stage of the subdivision DA.

7.1 Credit calculations and classes

7.1.1 Ecosystem credits

The ecosystem credits required to offset the proposal are provided in **Table 7.1** and **Appendix D**. A total of two ecosystem credits are required to offset the proposed development, impacting 0.10 ha of PCT 1289.

Table 7.1: Ecosystem credits summary and credit profiles.

Veg zone number	Plant community type	Credits required	Price per credit
1	Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion (PCT 1289)	2	$20,058.85
		Total (inc. GST)	**$44,129.47**

7.1.2 Species credit

As detailed within **Section 4**, no species credit species habitat was identified within the subject land. Therefore, no species credits are required to be offset for the proposed development.

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Appendix A Plot data collected

Plot No.	PCT	Area (ha)	Condition class	Zone	Easting	Northing	Bearing
1	1289	48.1	Exotic grassland	56	197925	6153447	330
2	1289	0.10	Degraded	56	197785	6153603	30
3	1289	48.1	Exotic grassland	56	197472	6153622	18
4	1289	48.1	Exotic grassland	56	197263	6153648	341
5	1289	48.1	Exotic grassland	56	197619	6153850	14
6	1289	48.1	Exotic grassland	56	198132	6154113	180
7	1289	0.10	Degraded	56	197996	6154240	224
8	1289	0.10	Degraded	56	197833	6153766	204
9	1289	2.44	Planted exotics and non-endemic native tress shrubs	56	197375	6153620	183

Plot No.	Composition					
	Tree	Shrub	Grass	Forb	Fern	Other
1	0	0	3	4	0	0
2	0	0	5	5	0	0
3	0	0	5	1	0	0
4	0	0	2	0	0	0
5	0	0	3	4	0	0
6	0	0	2	3	0	0

Plot No.	Composition					
	Tree	Shrub	Grass	Forb	Fern	Other
7	0	0	8	4	0	0
8	0	0	6	4	0	0
9	1	0	1	2	0	0

Plot No.	Structure					
	Tree	Shrub	Grass	Forb	Fern	Other
1	0	0	20.7	0.9	0	0
2	0	0	32.6	0.6	0	0
3	0	0	1.9	0.1	0	0
4	0	0	0.6	0	0	0
5	0	0	10.3	0.4	0	0
6	0	0	2.1	0.3	0	0
7	0	0	28	0.4	0	0
8	0	0	28.2	0.4	0	0
9	2	0	0.5	0.2	0	0

Plot No.	Function										
	Large trees	Hollow trees	Litter cover (%)	Fallen logs (m)	Tree steam 5-10 cm	Tree stem 10-20 cm	Tree stem 20-30 cm	Tree steam 30-50 cm	Tree stem 50-80 cm	Tree regen	High threat exotic
1	0	0	0	0	0	0	0	0	0	0	1.1
2	0	0	0	0	0	0	0	0	0	0	0.3
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0

Plot No.	Function										
	Large trees	Hollow trees	Litter cover (%)	Fallen logs (m)	Tree steam 5-10 cm	Tree stem 10-20 cm	Tree stem 20-30 cm	Tree steam 30-50 cm	Tree stem 50-80 cm	Tree regen	High threat exotic
5	0	0	0	0	0	0	0	0	0	0	0.2
6	0	0	0	0	0	0	0	0	0	0	0.1
7	0	0	0	0	0	0	0	0	0	0	0.1
8	0	0	0	0	0	0	0	0	0	0	0.2
9	0	0	0	0	0	0	0	0	0	0	5.5

Appendix B Flora and fauna inventories

Flora

Family	*Scientific Name*	Common name	Native/Exotic
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed	Native
	Amaranthus spp.	Amaranth	Native
Asteraceae	*Arctotheca calendula*	Capeweed	Exotic
	Carthamus lanatus	Saffron Thistle	Exotic
	Cirsium vulgare	Spear Thistle	Exotic
	Conyza spp.	A Fleabane	Exotic
	Cotula australis	Common Cotula	Native
	Euchiton sphaericus	Star Cudweed	Native
	Gamochaeta calviceps	Cudweed	Exotic
	Gamochaeta spp.		Exotic
	Hypochaeris radicata	Catsear	Exotic
	Onopordum acaulon	Stemless Thistle	Exotic
	Pseudognaphalium luteoalbum	Jersey Cudweed	Native
	Sonchus oleraceus	Common Sowthistle	Exotic
	Taraxacum officinale	Dandelion	Exotic
	Xanthium spinosum	Bathurst Burr	Exotic
Boraginaceae	*Echium plantagineum*	Patterson's Curse	Exotic
Brassicaceae	*Capsella bursa-pastoris*	Shepherd's Purse	Exotic
	Hirschfeldia incana	Buchan Weed	Exotic
	Lepidium africanum	Common Peppercress	Exotic
Campanulaceae	*Wahlenbergia gracilis*	Sprawling Bluebell	Native
Caryophyllaceae	*Gypsophila tubulosa*	Annual Chalkwort	Native
	Paronychia brasiliana	Chilean Whitlow Wort, Brazilian Whitlow	Exotic
	Stellaria media	Common Chickweed	Exotic
Chenopodiaceae	*Chenopodium album*	Fat Hen	Exotic
	Dysphania pumilio	Small Crumbweed	Native
Fabaceae (Faboideae)	*Medicago polymorpha*	Burr Medic	Exotic
	Medicago sativa	Lucerne	Exotic
	Trifolium glomeratum	Clustered Clover	Exotic
	Trifolium repens	White Clover	Exotic
	Trifolium spp.	A Clover	Exotic
	Trifolium subterraneum	Subterranean Clover	Exotic
Geraniaceae	*Erodium cicutarium*	Common Crowfoot	Exotic
	Erodium crinitum	Blue Crowfoot	Native
Juncaceae	*Juncus spp.*	A Rush	Native
Malvaceae	*Malva parviflora*	Small-flowered Mallow	Exotic
	Modiola caroliniana	Red-flowered Mallow	Exotic
Myrtaceae	*Eucalyptus baueriana*	Blue Box	Native
Oxalidaceae	*Oxalis spp.*		Native

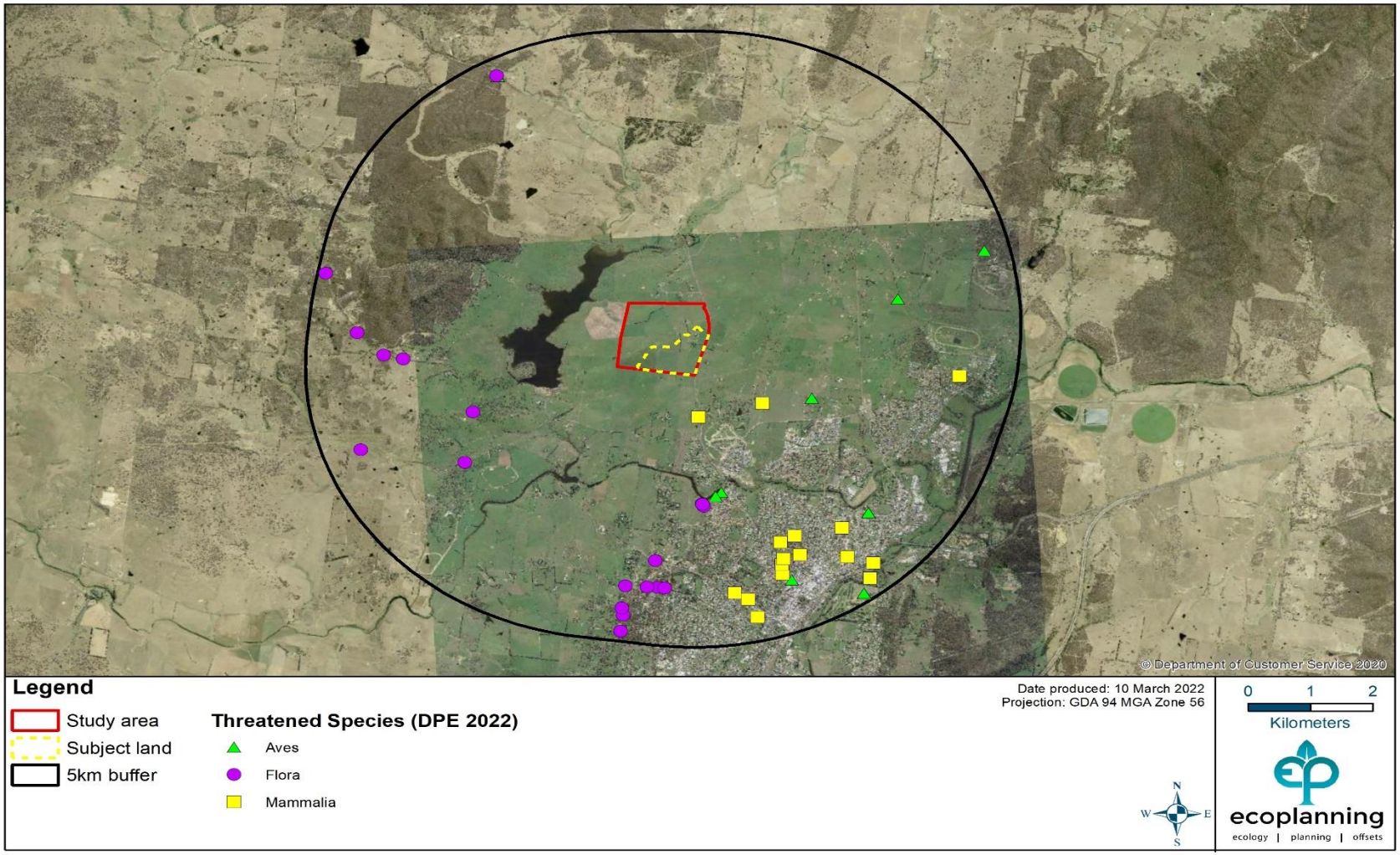
Family	*Scientific Name*	Common name	Native/Exotic
Pinaceae	*Pinus radiata*	Radiata Pine	Exotic
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	Exotic
Poaceae	*Austrostipa bigeniculata*	Yanganbil	Native
	Austrostipa scabra subsp. falcata	Rough Speargrass	Native
	Avena spp.	Oats	Exotic
	Bromus catharticus	Praire Grass	Exotic
	Bromus molliformis	Soft Brome	Exotic
	Chloris truncata	Windmill Grass	Native
	Cynodon dactylon	Common Couch	Native
	Dactylis glomerata	Cocksfoot	Exotic
	Digitaria sanguinalis	Crab Grass	Exotic
	Echinochloa crus-galli	Barnyard Grass	Exotic
	Eleusine tristachya	Goose Grass	Exotic
	Eragrostis trachycarpa	A Lovegrass	Native
	Holcus lanatus	Yorkshire Fog	Exotic
	Hordeum spp.	A Barley Grass	Exotic
	Hordeum vulgare	Barley	Exotic
	Lachnagrostis filiformis		Native
	Lolium perenne	Perennial Ryegrass	Exotic
	Lolium spp.	A Ryegrass	Exotic
	Nassella trichotoma	Serrated Tussock	Exotic
	Panicum gilvum		Exotic
	Paspalum dilatatum	Paspalum	Exotic
	Paspalum distichum	Water Couch	Native
	Phalaris aquatica	Phalaris	Exotic
	Rytidosperma spp.		Native
	Vulpia spp.	Rat's-tail Fescue	Exotic
Polygonaceae	*Acetosella vulgaris*	Sheep Sorrel	Exotic
	Polygonum aviculare	Wireweed	Exotic
	Rumex brownii	Swamp Dock	Native
	Rumex crispus	Curled Dock	Exotic
Portulacaceae	*Portulaca oleracea*	Pigweed	Native
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	Exotic

Fauna

Order	*Scientific Name*	Common name	Native/Exotic	Observation
Aves	*Ocyphaps lophotes*	Crested Pigeon	Native	O
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Native	W
	Corvus coronoides	Australian Raven	Native	OW
	Passer domesticus	House Sparrow	Exotic	Ow
Mammalia	*Oryctolagus cuniculus*	European Rabbit	Exotic	O

O = seen, W = heard, OW = seen and heard

Appendix C Near analysis and likelihood of occurrence table



Location of all threatened species recorded on the BioNet Atlas (DPE 2022) within 5 km of the subject land and within the past 20 years

Scientific Name Common Name	Legal Status	Number of records	Closest records and date	Most recent and proximity	Likelihood of occurrence	
					Prior to field assessment	Post field assessment
KINGDOM: Animalia, CLASS: Aves						
Anthochaera phrygia (Regent Honeyeater)	BC Act = E4A EPBC Act = CE	1	3.8 km (04/09/2009)	(04/09/2009) 3.8 km	Low	Not present
Calidris acuminata (Sharp-tailed Sandpiper)	EPBC Act = C,J,K	1	4.9 km (19/11/2011)	(19/11/2011) 4.9 km	Low	Not present
Callocephalon fimbriatum (Gang-gang Cockatoo)	BC Act = V,3 EPBC Act = E	2	3.1 km (08/10/2004)	(04/09/2009) 3.8 km	Low	Not present
Daphoenositta chrysoptera (Varied Sittella)	BC Act = V	1	4.6 km (26/11/2005)	(26/11/2005) 4.6 km	Low	Not present
Epthianura albifrons (White-fronted Chat)	BC Act = V,	1	3.8 km (04/09/2009)	(04/09/2009) 3.8 km	Low	Low
Gallinago hardwickii (Latham's Snipe)	EPBC Act = J, K	2	2.3 km (26/11/2005)	(19/02/2022) 4.8 km	Low	Not present
Hieraaetus morphnoides (Little Eagle)	BC Act = V	3	1.9 km (22/11/2019)	(22/11/2019) 1.9 km	Low	Not present
Petroica boodang (Scarlet Robin)	BC Act = V	2	3.8 km (04/09/2009)	(04/09/2009) 3.8 km	Low	Not present
KINGDOM: Animalia, CLASS: Mammalia						
Miniopterus orianae oceanensis (Large Bent-winged Bat)	BC Act = V	3	0.8 km (27/10/2021)	(27/10/2021) 0.8 km	Low	Low
Pteropus poliocephalus (Grey-headed Flying-fox)	BC Act = V, EPBC Act = V	20	3.4 km (14/01/2018)	(31/03/2019) 4.1 km	Low	Low
KINGDOM: Plantae						
Leucochrysum albicans var. tricolor (Hoary Sunray)	EPBC Act = E	16	2.5 km (29/09/2021)	(29/09/2021) 2.5 km	Low	Not present
Rutidosis leptorrhynchoides (Button Wrinklewort)	BC Act = E1 EPBC Act = E	3	2.4 km (03/11/2009)	(19/12/2020) 2.4 km	Low	Not present

* Unless other stated, text is taken from the OEH Threatened Species (http://www.environment.nsw.gov.au/threatenedspecies/); Legal Status codes from the Atlas of NSW Wildlife: V = Vulnerable, E1 = Endangered, E2 = Endangered Population, E4A = Critically Endangered, C = China and Australia Migratory Bird Agreement (CAMBA), J = Japan and Australia Migratory Bird Agreement (JAMBA); BC Act = NSW *Biodiversity Conservation Act 2016,* EPBC Act = Commonwealth *Environment Protection and Biodiversity Conservation Act 1999..*

** The potential for each threatened species, population and/or migratory species to occur was then considered and the necessity for targeted field surveys was determined. Following field surveys and review of available habitat within the Subject land, the potential for species to utilise the site and be affected directly or indirectly by the proposal were considered as either:

- “Recent record” = species has been recorded in the subject land within the past 5 years
- “High” = species has previously been recorded in the subject land (<5 years ago) or in proximity (for mobile species), and/or habitat is present that is likely to utilised by a local population
- “Moderate” = suitable habitat for a species is present onsite but no evidence of a species detected and relatively high number of recent records (5-20 years) in the locality or species is highly mobile
- “Low” = suitable habitat for a species is present onsite but limited or highly degraded, no evidence of a species detected and relatively low number of recent records in the locality
- “Not present” = suitable habitat for the species is not present onsite or adequate survey has determined species does not occur in the subject land

Appendix D Biodiversity payment summary report

NSW GOVERNMENT

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00030817/BAAS18047/22/00030818		4	10/05/2022

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Ed Cooper	BAAS18047	2021-012 515 Crookwell Rd	Open

Assessment Type	Date Finalised	BOS entry trigger
Part 4 Developments (General)	To be finalised	BOS Threshold: Area clearing threshold

PCT list

Price calculated	PCT common name	Credits
Yes	**1289 -** Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion	2

Species list

Price calculated	Species	Credits

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Assessment Id	Proposal Name	Page 1 of 2
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Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Monaro	**1289 -** Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion	No	Temperate Montane Grasslands >=50% and <70%	20.69%	$643.48	2.0318	$ 20,058.85	2	$40,117.70

Subtotal (excl. GST)	**$40,117.70**
GST	**$4,011.77**
Total ecosystem credits (incl. GST)	**$44,129.47**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price

No species available

Grand total	**$44,129.47**

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Proposal Name: 2021-012 515 Crookwell Rd

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BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00030817/BAAS18047/22/00030818	2021-012 515 Crookwell Rd	24/11/2021
Assessor Name	Report Created	BAM Data version *
Ed Cooper	10/05/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS18047	Part 4 Developments (General)	Open
Assessment Revision	BOS entry trigger	Date Finalised
4	BOS Threshold: Area clearing threshold	To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Diamond Firetail	Stagonopleura guttata	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Dusky Woodswallow	Artamus cyanopterus cyanopterus	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Flame Robin	Petroica phoenicea	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Large Bent-winged Bat	Miniopterus orianae oceanensis	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Little Eagle	Hieraaetus morphnoides	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Scarlet Robin	Petroica boodang	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion

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BAM Predicted Species Report

Speckled Warbler	Chthonicola sagittata	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Spotted Harrier	Circus assimilis	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Varied Sittella	Daphoenositta chrysoptera	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
White-fronted Chat	Epthianura albifrons	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
White-throated Needletail	Hirundapus caudacutus	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C

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BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00030817/BAAS18047/22/00030818	2021-012 515 Crookwell Rd	24/11/2021
Assessor Name	Report Created	BAM Data version *
Ed Cooper	10/05/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS18047	Part 4 Developments (General)	Open
Assessment Revision	Date Finalised	BOS entry trigger
4	To be finalised	BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Aromatic Peppercress	Lepidium hyssopifolium	Refer to BAR
Austral Toadflax	Thesium australe	Refer to BAR
Baeuerlen's Gentian	Gentiana baeuerlenii	Habitat constraints
Black Gum	Eucalyptus aggregata	Refer to BAR
Buttercup Doubletail	Diuris aequalis	Geographic limitations
Button Wrinklewort	Rutidosis leptorrhynchoides	Refer to BAR
Creeping Hop-bush	Dodonaea procumbens	Refer to BAR
Dwarf Kerrawang	Commersonia prostrata	Refer to BAR
Golden Sun Moth	Synemon plana	Geographic limitations

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BAM Candidate Species Report

Grassland Earless Dragon	Tympanocryptis pinguicolla	Refer to BAR
Hoary Sunray	Leucochrysum albicans var. tricolor	Refer to BAR
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Little Eagle	Hieraaetus morphnoides	Habitat constraints
Omeo Storksbill	Pelargonium sp. Striatellum	Refer to BAR
Paddys River Box, Camden Woollybutt	Eucalyptus macarthurii	Refer to BAR
Pink-tailed Legless Lizard	Aprasia parapulchella	Habitat constraints
Silky Swainson-pea	Swainsona sericea	Refer to BAR
Southern Bell Frog	Litoria raniformis	Refer to BAR
Southern Myotis	Myotis macropus	Habitat constraints
Striped Legless Lizard	Delma impar	Refer to BAR
Tarengo Leek Orchid	Prasophyllum petilum	Refer to BAR

Assessment Id
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Proposal Name
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